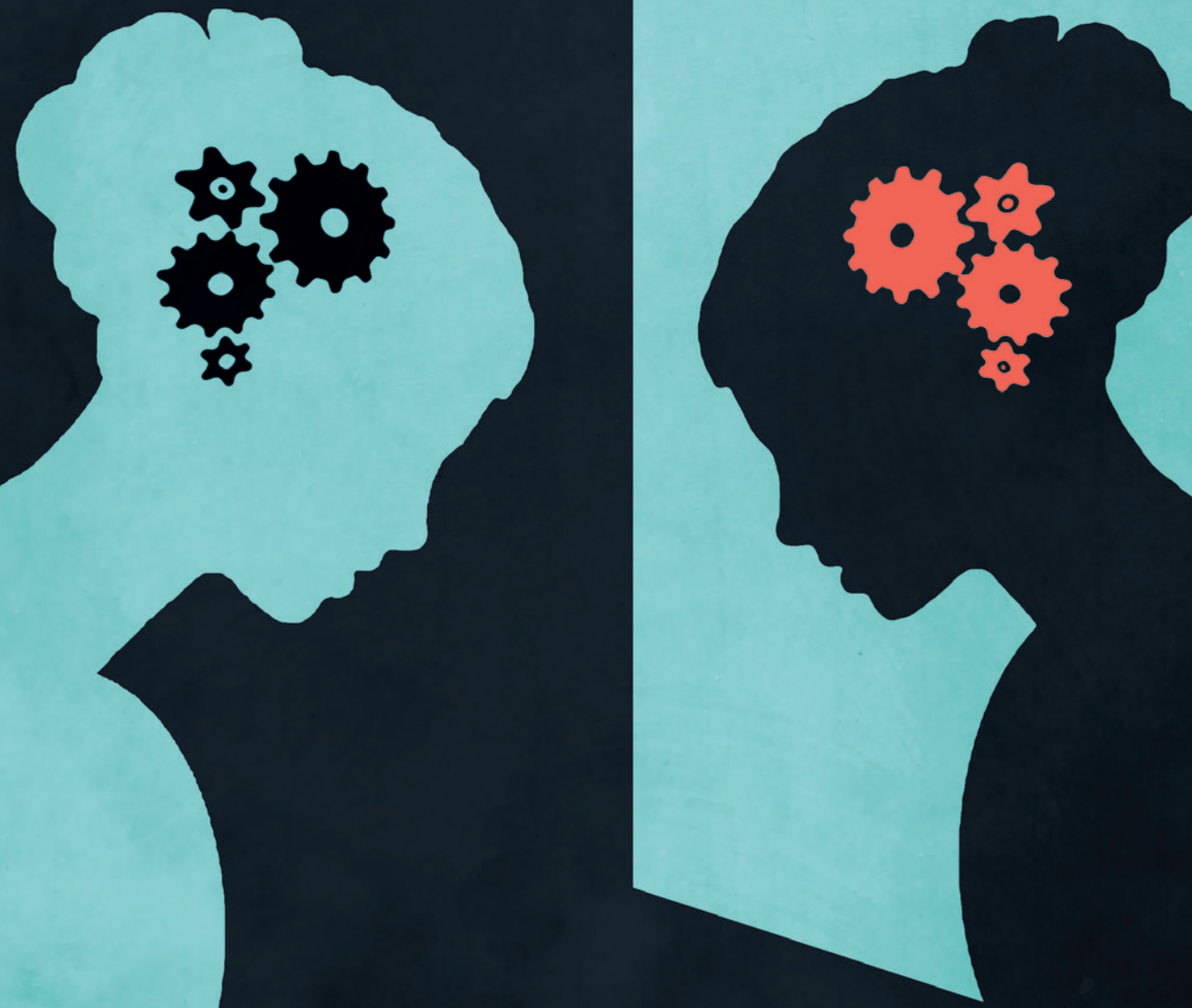
Implicit and explicit self-attitudes in relation to adolescent and young adult depression, stress and treatment



Daan Creemers

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Daniël Hubertus Maria Creemers
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Promotoren
Prof. dr. R.H.J. Scholte
Prof. dr. R.C.M.E. Engels
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Mijn moeder is mijn naam vergeten
Mijn moeder is mijn naam vergeten.
Mijn kind weet nog niet hoe ik heet.
Hoe moet ik mij geborgen weten?

Noem mij, bevestig mijn bestaan,
Laat mijn naam zijn als een keten.
Noem mij, noem mij, spreek mij aan,
o, noem mij bij mijn diepste naam.

Voor wie ik liefheb, wil ik heten.

Neeltje Maria Min

Contents

Chapter 1

General introduction

Victim of Your Own Thoughts

Lisa

Four years ago, as a therapist, I met Lisa; a friendly young 19 years old female who was highly intelligent, socially competent, and raised in a loving and caring home. One would think that the world is at her feet and a bright future is waiting. However, during our first session, it became very clear that there was a lot more going on than what meets the eye. It quickly became apparent that her life was a struggle and that daily activities that we perceive as normal, like getting out of bed, go to the gym, meeting with friends, and getting off to work, were a huge challenge for her. She had a history of depression, which she experienced since the age of fourteen, and showed frequent relapses in depressive symptoms. During the current relapse, it felt like the earth was swept away under her feet and death was considered a relief compared to living. Strong negative beliefs (i.e., attitudes) about herself, the future, and the world seemed to have 'control' over her thoughts, affecting her emotional life; 'I don't add anything to this world, I'm a failure and the future is black.' Despite the fact that she received therapy in the past, Lisa seemed powerless to turn around this negative loop. Interestingly, she was constantly aware of the automatic activation of negative self-attitudes and knew that these self-attitudes were probably responsible for the preservation of her depressive symptoms. Despite this awareness, she was not able to reverse this disruptive cognitive process; 'It feels like being on the passenger's seat in my own head, depressive thoughts arise automatically and I'm just not able to stop them.' This process intrigued me and made me want to know more about the automaticity in self-evaluative processes in order to eventually help people like Lisa who are struggling with depression.

The Relevance of Examining Depression in Adolescence and Young Adulthood

During adolescence, the prevalence of depressive symptoms rises dramatically (Petersen, Kennedy, & Sullivan, 1991). The incidence of a clinical depression disorder during adolescence is between 4% and 8% (Birmaher et al., 1996) while by the end of adolescence, between 17% and 28% of all individuals suffer from a clinical depression (Kessler, Avenevoli, & Merikangas, 2001). In accordance with these figures, in adults suffering from a depressive disorder, 75% experienced their first episode of depression during adolescence (Kim-Cohen et al., 2003). Consequently, depression is one of the most common mental disorders during adolescence (Kessler et al., 2001) and a major concern of public health. Adolescent girls have been found to be at a higher risk to develop a depression compared to boys (Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Nolen-Hoeksema, 1994). In addition to the economic burden for society (Greenberg & Birnbaum, 2005), at an individual level, depressive symptoms during adolescence may have disrupting short- and long term consequences. For example, depressive symptoms during adolescence can predict anxiety disorders later on in life (Fergusson & Woodward, 2002), poor psychosocial and academic functioning, and substance use (Birmaher et al., 1996). Furthermore, previous studies showed that depressive symptoms are an important risk factor for adolescent suicide (Evans, Hawton, & Rodham, 2004; Pagliaro, 1995).

Depression in the Netherlands

In the Netherlands, approximately 37.000 (4%) adolescents suffer from a depressive disorder every year (Meijer et al., 2006). In addition, 20% of Dutch adolescents report depressed mood, which is an important risk factor for the onset of a clinical depressive disorder (Meijer et al., 2006). In line with these figures concerning adolescents, depression is a major concern of public health in the Netherlands. That is, according to a conservative estimation, depression costs Dutch society €1.5 billion per year (Meijer et al., 2006; Smit et al., 2006). Depressive disorders explain 8.2% of the days of absence from work, which makes it the biggest cause of absenteeism (Meijer et al., 2006; Smit et al., 2006). Furthermore, treatment success is often temporary, as the risk for recurrence is 50% after a single episode, 70% after two episodes, and 90% after three or more episodes (Romijn et al., 2007). These figures illustrate the challenges associated with improving mental health care for individuals suffering from depression. Therefore, this thesis aims to extend the current literature on the determinants of depression to eventually contribute to improving mental health care.

Why Study Self-Attitudes and Depression?

Cognitive models posit that internalizing problems, including depression, are related to dysfunctional attitudes existing in memory (Clark, Beck, & Alford, 1999; Ellis, 2006). Attitudes can be defined as associations in memory between an object (e.g., socials objects such as the self or others) and an evaluative category (e.g., Albarracin, Johnson, & Zanna, 2005; Fazio, Chen, McDonal, & Sherman, 1982). Examples of evaluative categories include disgusting - appealing, dangerous - safe, worthless - valuable, likeable – dislikable (e.g., Ajzen, 2001). Across the life span, people develop attitudes towards 'the self' that are evaluative in nature and provide information about self-worth and acceptance. For example, due to negative life events and experiences of failure, someone might hold the self-attitude 'I'm a failure and have no worth for others.' Based upon (early) life experiences, self-attitudes are formed and eventually become stable cognitive structures shaping thoughts, behavior, and emotions of individuals. Self-attitudes in which we evaluate and give worth to ourselves are often conceptualized as *self-esteem*.[1] In line with this, self-esteem has been defined as an individual's conscious feeling of self-worth and acceptance (Rosenberg, 1965). Previous studies have consistently showed that self-esteem is highly important in predicting depression (Harter, 1993; Sowislo, & Orth, 2013).

In order to explain the relationship between self-esteem and depression, two dominant models exist in the current literature. First, the *vulnerability model* holds that low self-esteem is an important risk factor for the onset of depression (e.g., Sowislo & Orth, 2013). Low self-esteem is perceived to be a causal factor in the onset and maintenance of depression (see also Beck, 1967a). An individual's (maladaptive) self-attitude influences information processing by interpreting situations or events in a way that is congruent with his or her perspective of the world and him/herself (Beck, 1967a). For example, negative self-attitudes bias information processing, as self-relevant information is processed in a typically negative manner, leading to the maintenance of negative beliefs about 'the self' (Clark et al., 1999). Second, the *scar model* assumes that low self-esteem is a consequence of depression instead of a predictive factor. Depressive episodes are assumed to leave cognitive scars in the self-concept of people suffering from depression (e.g., Coyne, Gallo, Klinkman, & Calarco, 1998). A recently published meta-analysis found a stronger evidence for the vulnerability model than for the scar model (Sowislo & Orth, 2013).

1 Self-attitudes are perceived as the building blocks of self-esteem and therefore these terms are used interchangeable within this thesis.

In line with the above, it has been argued that low self-esteem is at the root of depressive symptoms (Taylor & Montgomery, 2007). Previous studies have consistently showed that self-esteem is negatively related to depressive symptoms (e.g., Sowislo & Orth, 2013; Vostanis, Feehan, Grattan, & Bickerton, 1996). Importantly, when negative assumptions towards the self frequently occur, they might become *automatic* thoughts activated when experiencing a negative event, which can subsequently lead to disproportionate down-regulation of mood and motivation characteristic of depression (Beck, 1979; Steinberg, 2005). To illustrate, Lisa experienced her negative (self) thoughts to appear automatic and be uncontrollable. This thesis aims to further examine the role of these automatic self-attitudes in depression (Chapter 2-3).

A General Introduction to Dual Process Models

Before trying to understand the disruptive phenomenon in which negative self-attitudes automatically emerged in Lisa's case, it seems relevant to sharpen our general understanding of automaticity in attitudes and subsequently human affect and behaviour. Dual process models provide a useful framework to do so, distinguishing between two qualitatively different cognitive processes, associative and reflective.

Associative Processing

First, one stream of information processing is characterized by relatively automatic, unconscious, uncontrollable, unintentional, and efficient way of processing in *the associative mode*. Associations in memory can be triggered automatically by internal or external stimuli, and they can subsequently spread out within the associative network based on feature similarity and spatiotemporal contiguity (Gawronski, & Bodenhausen, 2006). For example, when one encounters an unknown animal on safari during a holiday in the Brazilian jungle, based on feature similarities, associations of 'predator', 'danger' and 'get away' are directly activated, resulting in the physical preparation for a quick get away through increased heart rate, higher cortisol and adrenaline levels, and heightened respiration. Logically, from an evolutionary perspective, this quick, automatic, and effortless way of processing information during situations we encounter is of crucial importance for survival. Moreover, in terms of effectiveness, the advantages of the associative processing mode are quite straightforward. Associative processing relies on associations in memory, which have been formed based upon repeated experience for a long period of time (Smith & DeCoster, 2000). As a result, the associative mode attends to similarities that have been observed through previous experiences and subsequently instigate behavior (approach or avoid) and affect. Due to the activation of positive attitudes by a given object or event, individuals are more

likely to show approach behavior while the activation of negative attitudes are more likely to prompt individuals to show avoidance behavior (Fazio & Towles-Schwen, 1999). Obviously, one can imagine how hard life would be if every situation or object we encountered in daily life would require consideration and logical reasoning regarding whether to approach or avoid it. Therefore, the associative mode is assumed to be the 'standard mode' determining human behavior based on automatic associations in memory, often referred to as *implicit attitudes*. Implicit attitudes can best be characterized as automatic affective reactions stemming from particular associations that are automatically activated when a relevant stimulus is encountered (Gawronski & Bodenhausen, 2006)[2]. Activated associations (i.e., implicit attitudes) do not require much cognitive capacity or an intention to evaluate an object (Cunningham, Raye, & Johnson, 2004). Importantly, implicit attitudes can become activated irrespective of whether an individual perceives these associative evaluations as accurate or inaccurate. For example, individuals often show more positive implicit racial attitudes towards their own ethnic group; however, when they become aware of these automatically activated racial attitudes, they often become 'corrected' (e.g., Fazio & Olsen, 2003; Gawronski & Bodenhausen, in press).

Reflective Processing

Second, in addition to the more automatic, unconscious, uncontrollable, and unintentional way of processing (the associative mode), information processing in *the reflective mode* represents a rule based, rational, conscious, intentional, slow, and effortful manner of processing information. The reflective mode requires a high amount of cognitive capacity and becomes apparent only when an individual is sufficiently motivated and has enough time and cognitive resources (Fazio & Towless-Schwen, 1999; Gawronski, & Bodenhausen, 2006; Strack, & Deutsch, 2004). For example, the implicit racial attitude mentioned above can become 'corrected' because another explicit attitude holds that 'negative evaluations about minority groups are wrong' (Gawronski & Bodenhausen, in press). The *explicit attitudes* that arise from reflective processing are able to override implicit attitudes and subsequently determine behaviour. In line with this, explicit attitudes have been found to be predictive of more controlled and deliberate behaviors, whereas implicit attitudes often predict spontaneous, uncontrolled behaviours, which are assumed to play a dominant role in psychopathology (Huijding & De Jong, 2006). Therefore, one of the aims of this thesis is to examine the role of implicit and explicit self-attitudes (i.e., implicit and explicit self-esteem) in depression.

2 In this thesis, we use the term implicit attitudes to refer to attitudes that are assessed through indirect measures, and therefore are presumably more automatic.

Working in Concert

Associative and reflective processes are qualitatively distinct cognitive processes that are assumed to work in concert and thus interact when an individual evaluates the world and him or herself (Cunningham & Zelazo, 2007). Recently, the Iterative Reprocessing model (IR) (Cunningham & Zelazo, 2007) was designed to describe the interaction between associative and reflective processes. The IR-model suggests a continuum ranging from relatively automatic processing to controlled reflective processing. Cunningham and Zelazo (2007) highlighted the recursive nature of both processes and posited that the outcome of initial automatic processing is used in subsequent reflective processing and vice versa (see also Gladwin, Figner, Crone, & Wiers, 2011; Strack & Deutsch, 2004). Importantly, Gawronski and Bodenhausen (2006) argued that both information-processing modes with distinct operating principles operate simultaneously, in some instances leading to explicit attitudes that are different from the implicit attitudes towards the same object/event. In this way, a discrepancy between implicit and explicit attitudes may occur. The extant research, although scarce, has argued that the discrepancy between implicit- and explicit self-attitudes is relevant for understanding internalizing problems. Therefore, one of the aims of this thesis is to further examine the role of implicit and explicit self-esteem and implicit-explicit self-esteem discrepancies in relation to depression (Chapter 2-3).

Dual Process Model of Depression

In order to gain a better understanding of cognitive processes in depressed individuals, a specific dual process model for depression has been introduced (Beevers, 2005). In line with general dual process models, Beevers emphasized the interplay between the two information processing modes, associative and reflective processing. In this model (Figure 1), negatively biased associative processing is assumed to characterize cognitive vulnerability for depression. Specifically, self-relevant information that is processed in a typical negative manner confers depression vulnerability (see also Clark et al., 1999). Negatively biased self-referent associative processing leads to a negative affective response and subsequently triggers a dysphoric mood. Because associative processing is assumed to be the 'standard information processing mode', a downward spiral may occur, which is hard to interrupt, leading to a persistence and a build up of depressive symptoms (i.e., like Lisa experienced). Importantly, reflective processing can correct the depressogenic process in which self-referent associative processing is biased. That is, associative processing is assumed to be dominant; however, reflective processing is triggered to interrupt when biased associative processing violates expectancies or when the outcomes in a specific situation are not helpful (Lieberman, 2003). Lieberman (2003) illustrated this principle using the following example:

> *'when we turn a doorknob to open a door we are making a number of assumptions about the nature of the doorknob in terms of structure and function. As long as the doorknob works as expected, these assumptions remain tacit allowing us to focus on other thoughts and most of the time we are not even reflectively aware of doorknobs at all (i.e., aware of the doorknob as 'a doorknob'). Doorknobs only recruit controlled processing when they cease to function as doorknobs because broken doorknobs are anomalous and cannot be assimilated by our more automatic processes. A broken doorknob that stands between us and where we want to be creates an expectancy violation that requires effort, attention, and reasoning to resolve. In these cases, controlled decision making processes occur primarily when automatic processes have failed to achieve our goals'* (p. 5).

Interestingly, the persistence of a downward spiral due to negative associative processing seems to depend on the content of the explicit attitudes. That is, it depends on whether expectancies are violated and thus on whether reflective processing is triggered to adjust biased associative processing in order to obtain euthymic mood. More specifically, it might be possible that individuals with negative explicit self-attitudes (i.e., low explicit self-esteem) become further entangled in a depressive mood because expectancies are not violated when negative associative processing occurs. Importantly, reflective processes may be corrected when enough cognitive resources (e.g., working memory capacity) are available and an individual is motivated to do so (Beevers, 2005). Reflective processing is effortful, and it may be limited by factors such as stress, time pressure, and distraction. Thus, an individual becomes vulnerable to depression particularly when cognitive resources are depleted.

Explicit and Implicit Self-Esteem

Dual process models propose that explicit and implicit attitudes are the result of the (possible) interplay between reflective and associative processing (e.g., Gawronski & Bodenhausen, 2006).[3] As mentioned above, self-attitudes in which we evaluate and give worth to ourselves -often conceptualized as self-esteem-, are assumed to be at the root of depressive symptoms (Harter, 1993; Sowislo, & Orth, 2013). Despite the profound relevance of self-esteem to psychological well-being, previous research has focused mainly on the association of *explicit self-esteem* with depression. Research examining the association of implicit self-esteem or implicit-explicit self-esteem discrepancies with internalizing problems in adolescents and young adults is scarce.

3 It should be noted that the outcome of reflective and associative processes consists of a lot more than implicit and explicit self-attitudes. Therefore, this thesis is limited in the sense that the findings on the relations of implicit and explicit self-attitudes with internalizing problems cannot be generalized to associations of reflective and associative processing with internalizing problems as a whole.

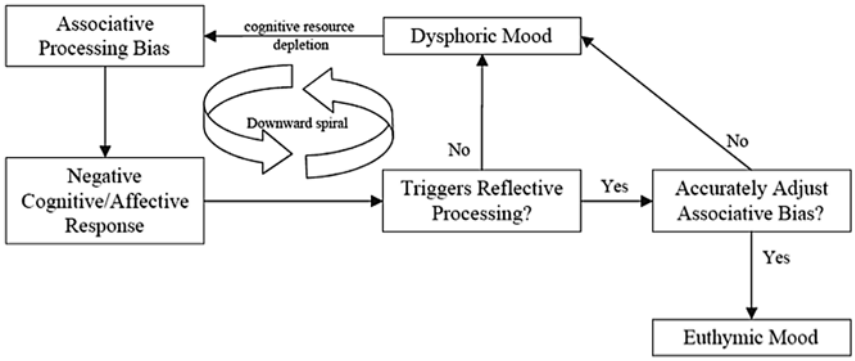

Figure 1 Depression Specific Dual-Process Model (Beevers, 2005)

Low explicit self-esteem has consistently been shown to predict depressive symptoms (Ingram et al., 1998; Vostanis, Feehan, Grattan, & Bickerton, 1996). Traditionally, self-esteem has been assessed using self-report measures, such as questionnaires, in which answers of participants reflect the outcome of conscious reasoning (i.e., reflective processing). In addition, implicit self-esteem has also been argued to be relevant in understanding the onset and maintenance of depression (Franck, De Raedt, & De Houwer, 2007a). While explicit self-esteem stems mainly from reflective processing and is assessed with self-report measures (i.e., questionnaires), implicit self-esteem is defined as relatively automatic, overlearned, and nonconscious evaluation of the self that guides spontaneous reactions to self-relevant stimuli (Greenwald & Banaji, 1995). Implicit self-attitudes are assumed to be primarily a product of the associative processing mode (e.g., Dijksterhuis, 2006), and they are relatively automatic, meaning that they are relatively more unconscious, unintentional, efficient, and uncontrollable compared to explicit self-attitudes (Bargh, 1994).

Both dimensions of self-esteem are assumed to have social origins and develop based on interactions with significant others (DeHart, Pelham, & Tennen, 2006). It has been argued that implicit and explicit self-esteem are established during distinct stages in life. Explicit self-esteem seems to reflect the outcome of more recent events and changes up to the age of 30 when core stability is reached (Robins & Trzesniewski, 2005). In contrast, implicit self-esteem is thought to be more primitive and develops earlier based on early interactions with primary care givers (e.g., DeHart et al., 2006). Overtime, these self-attitudes become over-learned and can be automatically activated. For example, individuals with a history of

emotional maltreatment during childhood report 'cognitive scars' by means of depressogenic implicit self-attitudes (Van Harmelen et al., 2010). From this point of view, implicit self-esteem can possibly be seen as the foundation of self-evaluation (Dijksterhuis et al., 2008).

Implicit Self-Esteem and Depression

Although a theoretical perspective about the role of associative processes in depression has been proposed (e.g., Beevers, 2005), research examining the association between implicit (and explicit) self-esteem and depression is relatively scarce.[4] However, existing research provides us with some intriguing but mixed findings. Based on cognitive theories and the depression specific dual process model, one could expect that depressive symptoms would consistently relate to low levels of both implicit and explicit self-esteem. However, depressive symptoms were found to be related to relatively high levels of implicit self-esteem (De Raedt, Schacht, Franck, & De Houwer, 2006; Franck et al., 2007b; Gemar, Segal, Sagrati, & Kennedy, 2001). Furthermore, relatively high implicit self-esteem predicted depressive symptoms at six months follow up in formerly depressed individuals (Franck et al., 2007a). In contrast, Risch et al. (2010) found that a relatively low implicit self-esteem was related to current depression and argued that reduced implicit self-esteem was related to multiple episodes of depression. Bos, Huijding, Muris, Vogel, and Biesheuvel (2010) and De Jong, Sportel, De Hullu, and Nauta, (2012) found no associations between implicit self-esteem and depression. The inconsistent results may be due to the use of different implicit measures and/or samples (e.g., age, gender, health status, and patients, among others). The vast majority of the studies were performed in adult; hence, the results for adolescents might be different. Therefore, the current thesis focused specifically on adolescent/young adult female samples in order to examine implicit and explicit self-esteem -and their interaction- in relation to depression (Chapter 2-3).

Implicit-Explicit Self-Esteem Discrepancies and Depression

As mentioned above, it is possible for an individual to develop different implicit and explicit attitudes toward him or herself over time, resulting in an implicit-explicit self-esteem discrepancy. In current research, we can distinguish between two forms of implicit and explicit self-esteem discrepancies: a) 'defensive' or 'fragile' self-esteem (Bosson, Brown, & Zeigler-Hill, 2003; Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003) reflecting high explicit and low implicit self-esteem and b) 'damaged' self-esteem (Schröder-Abé, Rudolph, Wiesner, & Schütz, 2007) consisting of high implicit and low explicit self-esteem. Considering

4 In Table 1, an overview is given of studies focusing on implicit self-esteem and depression.

the assumption that implicit self-esteem forms based on older and explicit self-esteem forms based on more recent events, Bosson and colleagues (2003) provided an example of how a implicit-explicit self-esteem discrepancy may occur.

> *'Consider a person who has negative implicit associations with the self, perhaps due to a troubled relationship with a caregiver in early childhood, but who comes to develop an explicit self-concept that is generally positive due to repeated achievements or popularity among peers. From our perspective, such a person might maintain this explicit-implicit discrepancy into adulthood and accordingly display certain personality and behavioral tendencies that indirectly reveal his or her underlying low self-esteem*' (p. 171).

Research on discrepancies between implicit and explicit self-esteem in relation to depression is still scarce. Interestingly, in a recent study, high implicit self-esteem combined with low explicit self-esteem (i.e., damaged self-esteem) was related to depressive symptoms and suicidal ideation (Franck et al., 2007b). Examining this concept might be relevant for further understanding of associations between self-esteem and internalizing problems. Therefore, we examined implicit-explicit self-esteem discrepancies in relation to depression (Chapter 2-3) and treatment (Chapter 6).

Implicit Self-Esteem and Stress

Both Beevers' dual process model of depression and cognitive theories emphasized the role of stress to understand cognitive processes in depression (Clark et al., 1999). Depression vulnerability has been characterized by the presence of dysfunctional self-attitudes in memory that remain latent and require activation to become apparent (Kelvin, Goodyer, Teasdale, & Brechin, 1999). Stress activates these dysfunctional self-attitudes in memory, which in turn may lead to depression (Beck et. al., 1979; Clark et al., 1999). Previous studies showed that stressful life events that instigate depression are often characterized by 'loss', 'humiliation', or 'defeat' (Brown, 1998; Kendler, Karkowski, & Prescott, 1999; Pine, Cohen, Johnson, & Brook, 2002). More specifically, stressful situations are assumed to potentially demean one's image or (social) self, and they have been found to activate various psychological and physiological responses (Gruenewald, Kemeny, Aziz, & Fahey, 2004). For example, events that are experienced as a threat to the social self (e.g., evaluative situations) decrease self-esteem, increase feelings of shame, intensify humiliation, and increase cortisol levels (Dickerson, Gruenewald, & Kemeny, 2004). When negative attitudes towards the self frequently become activated, they might become automatic and a part of the associative network, leading to the vulnerability to depression (Beevers, 2005). However, little is known about the effect of stress on both implicit and explicit self-attitudes.

Table 1 Overview of Studies Examining Implicit Self-Esteem and Depression

Study	N	Sample Type/Manipulation	Instrument
Bos et al., (2010)	264	Adolescents	IAT
De Jong et al., (2012)	1806	Adolescents	IAT
De Raedt et al., (2006) Study 1	30	Adult Patients Healthy Adults	IAT
De Raedt et al., (2006) Study 3	26	Adult Patients Healthy Adults	EAST
Franck et al., (2007a)	95	Adult Patients Adult Ex-patients Healthy Adults	NLT
Franck et al., (2007b)	46	Adult Patients with SI Adult Patients no SI Healthy Adults	IAT
Franck et al., (2008)	102	Adult Patients Adult Ex-Patients Healthy Adults /Mood Induction	IAT
Gemar et al., (2001)	82	Adult Patients Adult Ex-Patients Healthy Adults/Mood Induction	IAT
Haeffel et al., (2007) Study 1	237	Students/Lab Stressor	IAT
Haeffel et al., (2007) Study 2	251	Students	IAT
Risch et al., (2010)	119	Adult Patients first episode Adult Patients recurrent episodes Adult Ex-patients with recurrent episodes Healthy Adults	IAT
Steinberg et al., (2007)	181	High Risk Students Low Risk Students	IAT

Note: ISE = Implicit Self-Esteem; IAT = Implicit Association Test; NLT = Name Letter Task; EAST = Extrinsic Affective Simon Task; SI = Suicidal Ideation; T2 = Time 2 (follow up); MI = Mood Induction; LS = Lab Stressor

To date, few experimental studies examined the effect of stress on implicit self-attitudes. Gemar, Segal, Sagrati, and Kennedy (2001) examined implicit self-esteem of participants with former depression, current depression, and healthy controls before and after a negative *mood induction*. The results indicated

	Results
	No associations of ISE with depressive symptoms.
	ISE did not predict depressive symptoms.
	Similar positive ISE in both healthy and patients.
	Higher ISE in depressed compared to healthy participants.
	Similar positive ISE in all groups. ISE predicted future depressive symptoms (6 months).
	Similar positive ISE in Patients with SI and healthy controls. Lower ISE in Patients no SI compared to healthy controls.
	Same positive implicit self-esteem in depressed and healthy controls. MI decreased ISE in ex-patients.
	Same positive implicit self-esteem in depressed and healthy controls. MI decreased ISE in ex-patients.
	Relative negative ISE * LS predicted higher immediate stress.
	ISE predicted depressive symptoms at T2.
	Lower ISE in Patients (with first episode) compared to healthy controls. No differences in ISE between ex-patients, recurrent patients and healthy controls. But lower ISE in recurrent patients with 3 or more episodes compared to recurrent patients with less than 3 episodes.
	High risk and relatively negative ISE predicted future depressive symptoms (4 months).

that formerly depressed individuals showed a decrease in implicit-self-esteem after a negative mood-induction, whereas implicit self-esteem in healthy controls did not change. Subsequently, Franck, De Raedt, and De Houwer (2008) replicated these findings. In addition, a negative mood induction was found to increase

implicit depression (automatic self-associations with 'sadness') in controls but not in formerly depressed individuals (Meites, Deveney, Steele, Holmes, & Pizzagalli, 2008). Implicit attitudes could play an important role in predicting a direct affective response to stress, whereas explicit attitudes are thought to be crucial for long-term depressive reactions and represent the final interpretation of stressful life events (Haeffel et al., 2007). In line with this, the assessment of implicit attitudes might be more appropriate for capturing the effect of stressful events because social desirability does not bias responses (Sato & Kawahara, 2012).

Little is known about changes in implicit and explicit attitudes after inducing stress, although stress is an important vulnerability marker for the onset of depression (Pine et al., 2002). Understanding these changes would allow us to determine the range of cognitive functions affected by stress more accurately. Therefore, this thesis aims to further explore the effect of acute stress on both implicit and explicit self-attitudes. Chapter 4 presents a study on the effect of induced stress on implicit and explicit self-attitudes.

Implicit Self-Esteem and Treatment (Cognitive Behaviour Therapy)

Cognitive Behaviour Therapy (CBT), which aims to modify maladaptive self-attitudes in order to decrease depressive symptoms, is often used to treat depressive symptoms (e.g., Webb, Auerbach, DeRubeis, 2012). CBT attempts to identify dysfunctional self-attitudes and replace them with attitudes that are more positive, resulting in healthy thoughts, emotions, and behaviour (Beck et al., 1979). A reduction in symptoms is assumed to be associated with and preceded by changes in negative self-attitudes (Beck & Clark, 1997). Although it has been argued that maladaptive self-attitudes (i.e., low self-esteem) are at the root of depressive symptoms (Taylor & Montgomery, 2007), studies examining treatment effects of CBT focused primarily on explicit self-attitudes, even though implicit self-attitudes and the discrepancy between implicit and explicit self-attitudes might also be relevant.

CBT has been consistently found to be effective in increasing explicit self-esteem in adolescents and adults with depressive symptoms (Butler, Chapman, Forman, & Beck, 2006; Taylor, & Montgomery, 2007; Vostanis et al., 1996), whereas little is known about the effects of CBT on implicit self-esteem or discrepancy scores between implicit and explicit self-esteem. To the best of our knowledge, no studies provide evidence of the CBT effects on implicit self-esteem (or discrepancy rates) in individuals with depressive symptoms. Research in related domains (i.e., anxiety) seems to suggest that CBT reduces implicit panic attitudes (Teachman, Marker, & Smith-Janik, 2008), which are an important predictor of change in the

severity of panic symptoms during treatment. Accordingly, Teachmann and Woody (2003) found that implicit phobic attitudes were related to phobic avoidance and were significantly reduced during the course of CBT treatment. However, the lack of a comparable control group in both studies made it impossible to draw conclusion about the causality between CBT and implicit self-attitudes. In addition, recent evidence suggests that brief CBT interventions (i.e., specific phobia) changed solely explicit attitudes but did not affect implicit attitudes (Huijding & De Jong, 2009).

To date, the effects of CBT on implicit and explicit self-esteem and the discrepancy between both concepts were not examined in adolescents with depressive symptoms. Therefore, in Chapters 5 and 6, studies were presented that report on a Randomized Controlled Trial (RCT) that we performed. The experimental group received CBT, whereas the control group filled out questionnaires. The CBT intervention that was used consisted of the first eight sessions of 'Op Volle Kracht (OVK)', which is an adapted and translated version of the Penn Resiliency Program (PRP; Brunwasser, Gillham, & Kim, 2009). OVK consists of a cognitive training based on CBT principles in which adolescents are taught to modify their dysfunctional attitudes into more positive attitudes (Gillham & Reivich, 2004). Adolescents are assumed to learn about the relationship among stressful events, negative thoughts, negative feelings, and behaviour. They are thought to search for evidence that supports or rejects their negative thoughts and learn to formulate more optimistic thoughts. Subsequently, adolescents are stimulated to examine the correctness of their negative thoughts by formulating the worst, best, and most probable consequence of an event. As a result, adolescents are assumed to be able to identify causal attributions and challenge inaccurate, pessimistic explanations (Gillham & Reivich, 2004). It was expected that OVK would decrease depressive symptoms.

In sum, Chapters 5 and 6 present studies that focused on the RCT. These studies had two main goals: 1) to examine the effect of CBT on depressive symptoms (Chapter 5) in order to test whether the CBT intervention was successful, 2) to examine the effect of the CBT intervention on implicit and explicit self-esteem and the discrepancy between both concepts (Chapter 6).

How to Measure Implicit Self-Attitudes?

As mentioned above, explicit attitudes are usually assessed in a direct way. For example, individuals are asked to verbalize their response or complete questionnaires. In contrast, implicit attitudes have to be measured by means of indirect measures. That is, indirect measures are designed to assess the strength of certain automatic associations in memory. In this thesis, we were specifically interested in automatic *self*-attitudes (i.e., implicit self-esteem) assessed with indirect measures.

Recently, Huijding (2006) argued that the use of indirect measures of implicit attitudes is interesting for psychopathology research for several reasons; a) indirect measures do not rely on the accessibility of attitudes and the capacity of conscious introspection, b) indirect measures are not sensitive to social desirability, and c) indirect measures aim to examine the *automatic* associations between certain stimuli (e.g., self) and attributes (e.g., worthless-valuable). As proposed by dual process models, it seems relevant to differentiate between implicit and explicit attitudes in order to further understand cognitive processes in psychopathology. Importantly, implicit (self) attitudes are more automatic, meaning that they are relatively more unconscious, unintentional, efficient, and uncontrollable compared to explicit self-evaluations (Bargh, 1994). In this thesis, we use the term implicit attitudes to refer to attitudes that were assessed through indirect measures, and are therefore presumably more automatic. According to De Houwer, Teige-Mocigemba, Spruyt, and Moors (2009), automaticity refers to several features (i.e., unconscious, uncontrollable, unintentional, and efficient way of processing), which can co-occur or be activated independently (Bargh, 1994; De Houwer et al., 2009).

In this thesis, two commonly used indirect measures were used to assess implicit self-esteem, the Implicit Association Test (IAT; Greenwald, McGhee & Schwartz, 1998) and the Name Letter Task (NLT; Nuttin, 1985). Both seem to have acceptable test-retest reliability and predictive validity (Karpinski, 2004), although their validity has been disputed by some recent critics (Burhmester et al., 2011). The IAT is designed to measure the strength of associations among concepts indirectly (Greenwald & Farnham, 2000). The underlying assumption of the IAT is that when certain concepts (i.e., valuable and me) are more strongly associated in memory compared to other concepts (i.e., valuable and not- me), responses are faster when these concepts share a response key. The Name Letter Task is based on the assumption that the initials of an individual's name are closely associated with the self (Nuttin, 1985) and that the relative liking of one's own initials in comparison with the liking of the other letters of the alphabet therefore reflects someone's implicit self-attitudes. Because participants are unaware of the logic behind the task, the evaluation of people's own initials can be qualified as an index of implicit self-esteem (Greenwald & Banaji, 1995).

Because it has been argued that implicit self-esteem is a complex multi-dimensional construct (Koole & Pelham, 2003) this thesis used two measures of implicit self-esteem. Chapters 2 and 3 present studies examining the relevance of implicit and explicit self-esteem as well as their discrepancy in association with indices of internalizing problems. However, distinct measures of implicit self-esteem were used (IAT vs. NLT).

Research Questions:

Part I: The Relevance of Implicit, Explicit Self-Esteem, their Interaction and Discrepancy in Relation to Adolescent and Young Adult Depression (Chapter 2-3):

- Are implicit self-esteem and explicit self-esteem associated with internalizing problems?
- Is the interaction between implicit and explicit self-esteem associated with internalizing problems?
- Is the discrepancy between implicit and explicit self-esteem associated with internalizing problems?
- Does the instrument matter? Implicit Association Test (IAT) vs. Name Letter Task (NLT)

Part II: The Effect of Acute Stress on Implicit and Explicit Self-Attitudes (Chapter 4):

- What is the effect of stress on implicit self-esteem and depression?
- What is the effect of stress on explicit self-esteem and depression?

Part III: A Randomized Controlled Trial: CBT Effectiveness on Depression and Implicit and Explicit Self-Esteem (and Discrepancy) (Chapter 5-6):

- What is the effect of CBT on depressive symptoms in adolescent girls with elevated levels of depression?
- What is the effect of CBT on implicit and explicit self-esteem, and their discrepancy?
- Trajectories of change: How do depressive symptoms, implicit, explicit self-esteem and their discrepancy develop during intervention?

Overview of studies

Chapters 2 and 3 present studies examining the relevance of implicit and explicit self-esteem as well as their interaction and discrepancy in association with indices of internalizing problems. Chapter 4 addresses the question of whether acute stress affects implicit self-attitudes and whether this effect is different for explicit self-attitudes. Next, Chapters 5 and 6 present a Randomized Controlled Trial that examines the effectiveness of a CBT intervention on depressive symptoms in adolescent girls with elevated levels of depression (Chapter 5) as well as the effects of the CBT intervention on implicit and explicit attitudes and their discrepancy (Chapter 6). Together, these studies aim to sharpen our knowledge on the complexity of self-evaluative processes by examining implicit self-attitudes in relation to depression, stress, and treatment.

Chapter 2

Implicit and Explicit Self-Esteem as Concurrent Predictors of Suicidal Ideation, Depressive Symptoms, and Loneliness

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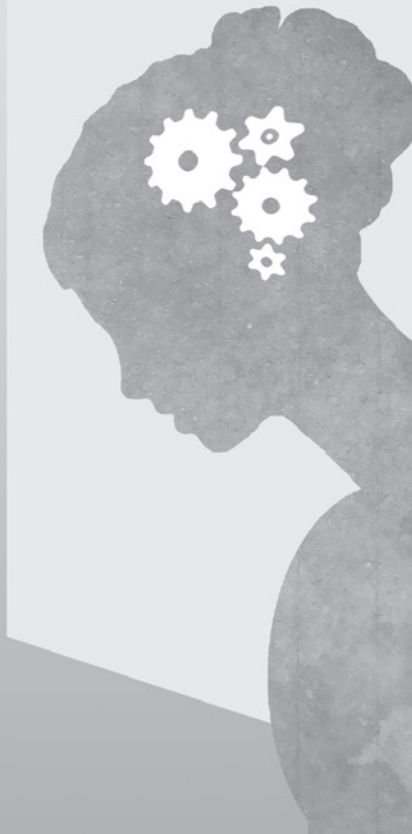

Abstract

The aim of the present study was to examine whether explicit and implicit self-esteem, the interaction between these two constructs, and their discrepancy are associated with depressive symptoms, suicidal ideation, and loneliness. Participants were 95 young female adults (M = 21.2 years, SD = 1.88) enrolled in higher education. We administered the Name Letter Task to measure implicit self-esteem, and the Rosenberg self-esteem scale to assess explicit self-esteem. The results indicated that explicit but not implicit self-esteem was negatively associated with depressive symptoms, suicidal ideation, and loneliness. The interaction of implicit and explicit self-esteem was associated with suicidal ideation, indicating that participants with high implicit self-esteem combined with a low explicit self-esteem showed more suicidal ideation. Furthermore, the size of the discrepancy between implicit and explicit self-esteem was positively associated with depressive symptoms, suicidal ideation, and loneliness. In addition, results showed that the direction of the discrepancy is an important: damaged self-esteem (high implicit self-esteem combined with low explicit self-esteem) was consistently associated with increased levels of depressive symptoms, suicidal ideation, and loneliness, while defensive or fragile self-esteem (high explicit and low implicit self-esteem) was not. Together, these findings provide new insights into the relationship of implicit and explicit self-esteem with depressive symptoms, suicidal ideation, and loneliness.

Introduction

Developmental change and exploration of possible life directions characterize the transition from late adolescence to early adulthood (Arnett, 2000). During this stage, adolescents make life choices often with long-lasting consequences, and strive for a greater independence from parents, which changes the relationships with parents and friends (Arnett, 2000, 2007). Schulenberg, Bryant, and O'Malley (2004; p.1119) described the developmental task of this period as 'trying to take hold of some kind of life.' For a substantial number of adolescents, this phase is associated with internalizing psychological problems (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Several theorists have proposed that explicit self-esteem plays a crucial role in the onset and maintenance of these internalizing problems (Brage & Meredith, 1994; Evans, Hawton, & Rodham, 2004; Harter, 1993; Prinstein & La Greca, 2002). Recently, it has been suggested that implicit self-esteem (De Raedt, Schacht, Franck, & De Houwer, 2006), or the discrepancy between implicit and explicit self-esteem (Schröder-Abé, Rudolph, & Schütz, 2007), could also relate to internalizing problems. However, research on implicit self-esteem and the discrepancy between implicit and explicit self-esteem is still scarce. Therefore, the purpose of this study was to gain more insights into the relationship of explicit self-esteem, implicit self-esteem, and the discrepancy between implicit and explicit self-esteem with internalizing psychological problems in female young adults.

Previous research suggests that various internalizing problems occur frequently during adolescence (Fleming & Offord, 1990; Fergusson, Woodward, & Horwood, 2000; Heinrich & Gullone, 2006). More specifically, three common internalizing problems in this period of life are depression (Fleming & Offord, 1990), suicidal ideation (Fergusson et al., 2000), and loneliness (Heinrich & Gullone, 2006). Compared with childhood, adolescence is associated with significant increases in the prevalence of depressive disorders (Petersen, Kennedy, & Sullivan, 1991). Studies show that one third of all adolescents show significant depressed moods (Petersen et al., 1993) and that the prevalence of clinical depression in adolescence is between 4% and 8% (Birmaher et al., 1996). Furthermore, adolescent depression may have serious consequences. Adolescent depression is associated with depression and anxiety disorders later on in life (Fergusson & Woodward, 2002), poor psychosocial and academic outcome, and an increased risk for substance abuse (Birmaher et al., 1996). In addition, depression is the most frequently reported risk factor associated with adolescent suicide (Pagliaro, 1995).

Furthermore, longitudinal studies suggest that suicidal ideation also increases during adolescence (Fergusson et al., 2000; Kerr, Owen, Pears, & Capaldi, 2008). Suicidal ideation is defined as thoughts that serve as a means to foster one's own

death (American Psychiatric Association, 2003). It can vary from thoughts about the worthlessness of life and a death wish to concrete suicide plans and an obsession with self-destruction. Suicidal ideation predicts suicide attempts (Evans, Hawton, Rodham, & Deeks, 2005) and is an important risk factor for completed suicide (King, 1997).

Next, an increased feeling of loneliness in adolescence is common (Sippola & Bukowski, 1999). Loneliness has been defined as an emotional aversive response to the discrepancy between the desired and the perceived interpersonal relationships of the individual (Peplau & Perlman, 1982). Loneliness has an important intrapersonal element because it reflects the discrepancy between the perception of one's social relationships and the desired social relationships (Heinrich & Gullone, 2006). Feelings of loneliness are associated with psychological and physical health problems as well as behavioural pathologies (Baumeister & Leary, 1995).

Depression, suicidal ideation, and loneliness are separate but related constructs (Boergers, Spirito, & Donaldson, 1998; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). According to cognitive theories, such forms of internalizing problems are the result of dysfunctional (self) schemas existing in memory (Clark, Beck, & Alford, 1999; Ellis, 2006; Mahon, Yarcheski, Yarcheski, Cannella, & Hanks, 2006). Schemas develop based on early life experiences and become stable cognitive structures that shape emotions, thoughts, and behaviour of individuals. Moreover, people tend to process information in a way that is congruent with their perspective of the world and themselves (Beck, 1967a). Accordingly, dysfunctional and negative self-schemas bias information processing and lead to negative beliefs towards 'the self', as self-relevant information is processed in a typical negative manner (Clark et al., 1999). To date, research has mainly focused on self-schemas that are explicit in the sense that they are available to conscious introspection. One example is explicit self-esteem. Explicit self-esteem can be defined as an individual's conscious feeling of self-worth and acceptance (Rosenberg, 1965). Consistent with the assumptions and predictions of the cognitive theory, previous studies consistently showed that explicit self-esteem has a strong inverse relationship with depression (Harter, 1993), suicidal ideation (Evans et al., 2004), and loneliness in adolescence (Prinstein & La Greca, 2002).

Recently, it has been suggested that implicit self-esteem could relate to internalizing psychological problems. Implicit self-esteem is defined as relatively automatic, overlearned, and nonconscious evaluation of the self that guides spontaneous reactions to self-relevant stimuli (Greenwald & Banaji, 1995). Moreover, according to dual-process models, we can distinguish between two information-processing modes with different operating principles, the cognitive and the experiential mode (Epstein, 1994). Explicit self-esteem reflects a product

of the cognitive mode, shaped through rational and conscious processing of self-relevant stimuli, whereas implicit self-esteem refers to the experiential mode, shaped through automatic, intuitive processing of affective experiences (Dijksterhuis, 2006; Epstein & Morling, 1995). Schemas in the experiential mode are 'generalizations about what the world and the self are like', based on 'synthesis of emotional significant experiences' (Teglasi & Epstein, 1998). In line with this, the experiential belief (e.g. implicit self-esteem) reflects a relatively automatic, affective evaluation of the self that may exist outside of awareness (Bosson, Swann, & Pennebaker, 2000). Implicit self-evaluations are presumably more automatic, meaning that they are relatively more unconscious, unintentional, efficient, and uncontrollable than explicit self-evaluations (Bargh, 1994). Theorists assume that implicit self-esteem develops earlier and is more primitive than explicit self-esteem (Bosson, Brown, Zeigler-Hill, & Swann, 2003; Koole, Dijksterhuis, & van Knippenberg, 2001), and stems, at least partly, from early social interactions (DeHart, Pelham, & Tennen, 2006). In line with this, implicit self-evaluations are likely to be produced by rather primitive self-enhancement mechanisms, whereas explicit self-evaluations are assumed to be more sophisticated cognitive judgments of the self (Swann & Schroeder, 1995).

Although research on implicit self-esteem is scarce, few studies that do exist have provided valuable information. In contrast to the cognitive theory, high levels of implicit self-esteem seem to be associated with depression in adults (De Raedt et al., 2006; Franck, De Raedt, Dereu, & Van den Abbeele, 2007; Franck, De Raedt, & De Houwer, 2008; Gemar, Segal, Sagrati, & Kennedy, 2001). Similarly, implicit self-esteem, but not explicit self-esteem, has been found to relate positively to future depressive symptoms at six months follow-up (Franck, De Raedt, & De Houwer, 2007). On the other hand, recent findings of Bos, Huijding, Muris, Vogel, and Biesheuvel (2010) suggest there is no association between implicit self-esteem and internalizing problems (e.g. depression and anxiety) in adolescents. To date, the relationship of implicit self-esteem with depressive symptoms, suicidal ideation and loneliness in early adulthood has not received any attention in previous research.

In addition to the unique associations of implicit and explicit self-esteem with indices of internalizing symptoms, it may be of value to consider the discrepancy between implicit and explicit self-esteem as relevant for understanding psychopathology. Implicit and explicit self-esteem are separate but related constructs (Bosson et al., 2000). To understand the role of implicit self-esteem in internalizing problems, the relationship between implicit and explicit self-esteem appears to be important. First, implicit self-esteem might moderate (i.e., buffer or change the nature of) the association between explicit self-esteem and each internalizing outcome. Alternatively, the discrepancy between implicit and explicit self-esteem

may be important to consider. Asymmetric changes of self-schemas (for example increases in implicit self-esteem and decreases in explicit self-esteem) may lead to discrepancies between implicit and explicit self-esteem, assuming that different processes influence implicit and explicit self-esteem (Gawronski & Bodenhausen, 2006). More specifically, we can distinguish between two forms of implicit and explicit self-esteem discrepancies: a) defensive (Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003) or fragile self-esteem (Bosson et al., 2003) reflecting high explicit and low implicit self-esteem and b) damaged self-esteem (Schröder-Abé, Rudolph, Wiesner, & Schütz, 2007) consisting of high implicit and low explicit self-esteem.

To explain why discrepancies between implicit and explicit self-esteem are a source of psychological problems, Schröder-Abé, Wiesner et al. (2007) hypothesized that both types of discrepancies are maladaptive because they indicate a lack of integration in self-representation. Franck, De Houwer et al. (2007) suggested that implicit self-esteem might be indicative of the 'ideal self,' whereas explicit self-esteem may represent the 'actual self.' People with damaged self-esteem feel trapped between their goals and the 'reality.' Due to the discrepancy between their goals and the 'reality,' which is experienced as disturbing, people feel entrapped, which in turn may lead to psychological problems. Furthermore, according to the buffer hypothesis, implicit self-esteem buffers the effects of low explicit self-esteem and functions as a defense mechanism against ego-threats (Bosson et al., 2003). In line with this, Jordan et al. (2003) argued that implicit self-esteem motivates individuals to restore their positive self-views.

Theoretically, it can be expected that not only explicit and implicit self-esteem but also the discrepancy between implicit and explicit self-esteem relate to psychopathology. Indeed, previous studies suggest that discrepancies between implicit and explicit self-esteem relate to defensive behaviour (Schröder-Abé et al., 2007), psychological conflict (Petty, Tormala, Briñol, & Jarvis, 2006), anger suppression, depressive attribution style, and nervousness (Schröder-Abé, Rudolph et al., 2007). To date, research on discrepancies between implicit and explicit self-esteem is scarce, and little is known about the relationship with depressive symptoms, loneliness, and suicidal ideation.

In sum, the aim of the present study was to investigate whether implicit self-esteem, explicit self-esteem and their interaction relate to depressive symptoms, suicidal ideation, and loneliness. Next, we examined the main effects of the discrepancy between explicit and implicit self-esteem and the direction of the discrepancy, as well as the interaction between these measures.

Methods

Participants

Ninety-five female undergraduate students of the College for Higher Education Arnhem/Nijmegen (HAN), in The Netherlands participated in this study. Their mean age was 21.2 years (SD = 1.88, Range = 19-30). Students participated voluntarily to the study.

Procedure

In order to recruit the College's students for this study, we contacted the principal of the College for Higher Education Arnhem/Nijmegen and asked his consent. After the principal consented, we provided the outline of the study to the teachers in a meeting. The teachers informed all students at the college about the study in advance and told them that their participation was voluntary. Data were collected during regular class sessions. Participants were seated at private computer stations and were told that the experiment investigated various predictors of human emotion. Participants started with the computerized implicit measure, the *Name Letter Task* (NLT; Nuttin, 1985). After completing this task, the computerized explicit self-esteem scale was administered. Subsequently, students completed questionnaires on depressive symptoms, suicidal ideation, and loneliness. Students had 60 min. to complete the questionnaires. All participants were told that if they became troubled or concerned about themselves after answering the questions in the questionnaires, they could obtain referrals to local therapists. Participants were also told that they could be informed when their scores on depressive symptoms reached clinical levels. No participants asked for a referral or indicated that they wanted to be informed about their scores.

Measures

Explicit self-esteem

A Dutch version of the *Rosenberg self-esteem scale* (RSES; Rosenberg, 1965) was used to measure global feelings of self-esteem (e.g., "I feel I do not have much to be proud of"). This instrument consists of 10 items measured on a 4-point scale *(totally agree-totally disagree)*. Past research demonstrated the validity and test- retest reliability of the RSES (Franck, De Raedt, Barbez, & Rosseel, 2008). Cronbach's α was .87 for the present sample.

Implicit self-esteem

To measure implicit self-esteem, a computerized version of the *Name Letter Task* (NLT; Nuttin, 1985) was administered. In random order, each letter of the alphabet was displayed once separately in the centre of the screen with the question: "How

much do you like this letter?" Participants evaluated each letter on a 7-point scale *(dislike very much-like very much).* Participants were instructed to work quickly and to follow their first intuitive reactions. There was no response window. The Name Letter Task is based on the assumption that the initials of an individual's name are closely associated with the self (Nuttin, 1985), and that the relative liking of one's own initials in comparison with the liking of the other letters of the alphabet therefore reflects someone's implicit self-attitudes. Because participants are unaware of the logic behind the task, the evaluation of people's own initials can be qualified as an index of implicit self-esteem, (Greenwald & Banaji, 1995). Past research has demonstrated the reliability and validity of the NLT (Bosson et al., 2000; Koole & Pelham, 2003). The experiment in the present study was programmed using Inquisit Millisecond software.

The *Self-corrected algorithm (S-algorithm)* was used to compute the index of implicit self-esteem (LeBel & Gawronski, 2009). In this algorithm, we computed the difference scores between the participants' mean ratings of their initials and the participants' mean ratings of non-initials. The mean rating of their initials was computed from participants' scores on the first letter of their first and last name. The mean ratings of participants' non-initials were subtracted from the mean ratings of their initials. Higher scores indicated higher levels of implicit self-esteem. This algorithm controls for individual differences in positive or negative affect (Watson, 1988) and rating tendencies or transient mood states (Schwarz, 1990).

Depressive symptoms

A Dutch translation of the *Beck Depression Inventory* (BDI-II; Beck, Steer, & Brown, 1996; Van der Does, 2002) was used to assess the existence and severity of depressive symptoms. Past research demonstrated good validity and psychometric properties of this scale (Van der Does, 2002). The instrument consists of 21 self-report items measured on a 4-point scale, each item ranging from 0 to 3. Cronbach's α was .89 for the present sample.

Suicidal ideation

A Dutch translation of the questionnaire developed by Heilbron and Prinstein (2010) was used to measure active suicidal ideation. The instrument was designed to assess suicidal thoughts in adolescents and young adults (e.g., "I thought that killing myself would solve my problems") and consists of 16 items measured on a 5-point scale *(never - almost every day).* This abbreviated measure includes a subset of items drawn from the Suicidal Ideation Questionnaire (SIG; Reynolds, 1988) and the NIMH-DISC-IV (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). Higher scores indicate higher levels of suicidal ideation. Cronbach's α was 0.89 for the present sample.

Loneliness

Participants completed a short version (R-ULS-8, Roberts, Lewinsohn, & Seeley, 1993) of the revised UCLA Loneliness Scale (R-ULS; Russell, Peplau, & Cutrona, 1980). Higbee and Roberts (1994) found satisfactory construct validity and reliability in other adolescent populations. The R-ULS-8 was translated into Dutch according to the guidelines of the International Test Commission (Hambleton, 1994). This scale consists of 8-items (e.g., "I feel left out") measured on a 5-point scale *(I totally disagree e totally agree).* Higher scores indicate higher levels of loneliness. Cronbach's α was .84 in the present sample.

Data analyses

To examine whether implicit and explicit self-esteem relate to suicidal ideation, depressive symptoms, and loneliness, we conducted a series of hierarchical multiple regression analyses with explicit self-esteem and implicit self-esteem entered in step 1 and their interaction in step 2. The interaction was tested using the procedure proposed by Aiken and West (1991). All variables were centered before being entered into the equation.

Subsequently, we examined whether the discrepancy between implicit and explicit self-esteem (cf., Briñol, Petty, & Wheeler, 2006) relates to suicidal ideation, depressive symptoms, and loneliness. To determine this discrepancy, we computed the absolute value of the difference between the standardized explicit and implicit measure of self-esteem. High scores on this variable indicate a larger discrepancy between implicit and explicit self-esteem. The discrepancy index indicates where people fall within the distribution of participants in examining the implicit versus explicit measures. Discrepancies could be in either direction; higher implicit than explicit self-esteem (indicating a negative discrepancy) or higher explicit than implicit self-esteem (indicating a positive discrepancy). In the present study, 44 participants had higher implicit than explicit self-esteem, and 51 participants had higher explicit than implicit self-esteem. Next to analyzing the size of the discrepancy, we included a variable that indicated the direction of the discrepancy (implicit < explicit or implicit > explicit; dummy code). To examine whether the discrepancy between implicit and explicit self-esteem is associated with suicidal ideation, depressive symptoms, and loneliness, we conducted a series of hierarchical multiple regression analyses with the size of the discrepancy and the direction of the discrepancy (dummy) entered in step 1 and their interaction in step 2. The use of discrepancy scores, the dummy variable, and the interaction between them has been found to be an appropriate manner of specifically testing the relative difference between implicit and explicit measures (Briñol et al., 2006; Schröder-Abé, Rudolph et al., 2007). The interaction effects were tested using the procedure proposed by Aiken and West (1991). The discrepancy score (size of the discrepancy) was centered before being entered into the equation.

Results

Demographic characteristics

Table 1 displays the descriptive statistics of all primary variables. Paired samples t-test showed that the mean ratings of the participants' non-initials differed significantly from the ratings of their initials, t (94) = 17.26, p < .001. This indicates that participants evaluated the initials of their names more positively than they evaluated non-initials.

Table 1 Descriptive Statistics for Measures of Implicit and Explicit Self-Esteem, Depressive Symptoms, Suicidal Ideation, and Loneliness

	Mean	SD	Range	Min	Max
Implicit Self-Esteem	1.71	.97	-6 - 6	-.19	4.08
Explicit Self-Esteem	30.65	4.42	10 - 40	18.00	40.00
Depressive Symptoms	8.29	7.32	0 - 63	.00	34.00
Suicidal Ideation	8.47	1.72	16 - 80	8.00	21.00
Loneliness	14.49	5.46	8 - 40	8.00	30.00

Table 2 includes intercorrelations among all study measures. The data on suicidal ideation did not have normal distribution. A logarithmic transformation was used to reduce the positive skewness of suicidal ideation. Implicit self-esteem was uncorrelated with any other variables. Explicit self-esteem correlated negatively with depressive symptoms, loneliness, and suicidal ideation. Depressive symptoms, suicidal ideation, and loneliness correlated positively with each other.

Table 2 Correlations among Measures of Implicit and Explicit Self-Esteem, Depressive Symptoms, Suicidal Ideation, and Loneliness

	1	2	3	4	5
1. Implicit Self-Esteem	-				
2. Explicit Self-Esteem	-.08	-			
3. Depressive Symptoms	.09	-.70**	-		
4. Suicidal Ideation	.18	-.36**	.38**	-	
5. Loneliness	-.07	-.67**	.60**	.29**	-

Note: ** p < .01

Associations with explicit and implicit self-esteem

To examine whether explicit and implicit self-esteem were associated with depressive symptoms, suicidal ideation, and loneliness, we conducted a series of hierarchical multiple regression analyses. The results of step 1 show a negative association of explicit self-esteem with depressive symptoms ($\beta = 0.70$, $p < 0.001$), suicidal ideation ($\beta = 0.38$, $p < 0.001$), and loneliness ($\beta = 0.68$, $p < 0.001$). Furthermore, the results showed that there was no significant direct association (i.e. main effect) of implicit self-esteem with depressive symptoms ($\beta = 0.04$, ns.) suicidal ideation ($\beta = 0.16$, ns.), and loneliness ($\beta = 0.11$, ns). Table 3 presents the results of the multiple hierarchical regression analyses. These results indicate that lower levels of explicit self-esteem, and not implicit self-esteem, were associated with higher levels of depressive symptoms, suicidal ideation, and loneliness.

Associations of the interaction between implicit and explicit self-esteem

To test whether the interaction between implicit and explicit self-esteem relates to depressive symptoms, suicidal ideation, and loneliness, we entered the interaction in step 2 of the same multiple hierarchical regression analyses as were reported on in the previous paragraph. Table 3 summarizes the results of the multiple hierarchical regression analyses. The results of step 2 show no significant associations of the interaction between implicit and explicit self-esteem with depressive symptoms ($\beta = 0.04$, ns.) and loneliness ($\beta = 0.07$, ns.). The interaction between implicit and explicit self-esteem associated significantly with suicidal ideation ($\beta = 0.28$, $p < 0.01$). Fig. 1 presents the predicted values for the interaction between implicit and explicit self-esteem. Comparison of the slopes of the regression lines representing low (-1 SD), medium (average), and high explicit self-esteem (+1 SD) indicated that the associations between implicit self-esteem and suicidal ideation were stronger when the participants had a low explicit self-esteem. When participants had high ($b = 0.007$, SE = 0.008, $p = 0.39$) or average ($b = 0.011$, SE = 0.006, $p = .057$) scores on explicit self-esteem, the level of implicit self-esteem did not relate to suicidal ideation. When participants had a low explicit self-esteem, their implicit self-esteem related significantly ($b = 0.029$, SE = 0.009, $p < 0.001$) to suicidal ideation, i.e., participants with a low implicit self-esteem scored low on suicidal ideation but participants with a high implicit self-esteem had the highest scores on suicidal ideation.

Associations of implicit-explicit discrepancies

Next, we next conducted a series of multiple hierarchical regression analyses to determine whether the size of the discrepancy, the direction of the discrepancy and their interaction relates to depressive symptoms, suicidal ideation, and

Table 3 Hierarchical Multiple Regression Analysis: Associations of Explicit Self-esteem, Implicit Self-Esteem, and the Interaction between Implicit and Explicit Self-Esteem with Suicidal Ideation, Depressive Symptoms, and Loneliness

	Suicidal Ideation			Depressive Symptoms			Loneliness		
	B	**SE**	**β**	**B**	**SE**	**β**	**B**	**SE**	**β**
Step 1									
Implicit Self-Esteem	.01	.01	.16	.33	.57	.04	-.65	.44	-.11
Explicit Self-Esteem	-.01	.00	-.38**	-1.15	.12	-.70**	-.84	.09	-.68**
Step 2									
Implicit Self-Esteem * Explicit Self-Esteem	-.00	.00	-.28**	-.07	.13	-.04	-.09	.10	-.07

Note: Suicidal ideation R^2 =.18 in step 1 (p =.00); Δ R^2 =.08 in step 2 (p = .00); Depressive Symptoms R^2 =.49 in step 1 (p =.00); Δ R^2 =.00 in step 2 (p = .58); Loneliness R^2 =.47 in step 1 (p =.00); Δ R^2 =.01 in step 2 (p = .38); ** p < .01.

loneliness.[5] Table 4 summarizes the results of the multiple hierarchical regression analyses. The results of step 1 showed that the size of the discrepancy was positively related to depressive symptoms (β = 0.22, p < 0.01) and suicidal ideation (β = 0.25, p < 0.01). We found no significant association between the size of the discrepancy and loneliness (β = 0.17, p = 0.09). The direction of the discrepancy was significantly related to all three internalizing symptoms (depressive symptoms β = 0.39, p < 0.01; suicidal ideation, β = 0.27, p < 0.01; loneliness, β = 0.29, p < 0.01). In addition, the results of step 2 showed that the interaction between the size of the discrepancy and the direction of the discrepancy was significantly associated with all three internalizing symptoms (depressive symptoms, β = 0.51, p < 0.01; suicidal ideation, β = 0.41, p < .01; loneliness, β = 0.42, p < 0.01, see Figs. 2 - 4). The consistent pattern across internalizing symptoms was that the associations between the size of the discrepancy and all symptoms was significantly stronger when the participants

5 The conventional regression model and the discrepancy regression model are two separate models and variables of both models need to be examined separately. Including the main effects of implicit and explicit self-esteem within the discrepancy regression model, would have led to a multicollinearity problem and to uninterpretable results. The analysis was therefore not performed and presented here.

Table 4 Hierarchical Multiple Regression Analysis: Associations of the Size of the Discrepancy, Direction of the Discrepancy, and the Interaction between the Size of the Discrepancy and the Direction of the Discrepancy with Suicidal Ideation, Depressive Symptoms, and Loneliness

	Suicidal Ideation			Depressive Symptoms			Loneliness		
	B	SE	β	B	SE	β	B	SE	β
Step 1									
Size of the Discrepancy	.02	.01	.25**	1.83	.79	.22*	1.07	.63	.17
Direction of the Discrepancy	.03	.01	.27**	5.66	1.36	.39**	3.10	1.08	.29**
Step 2									
Size of the Discrepancy * Direction of the Discrepancy	.05	.01	.41**	6.46	1.44	.51**	3.92	1.19	.42**

Note: Suicidal ideation R^2 =.15 in step 1 (p =.00); Δ R^2 =.09 in step 2 (p = .00); Depressive Symptoms R^2 =.22 in step 1 (p =.00); Δ R^2 =.14 in step 2 (p = .00); Loneliness R^2 =.12 in step 1 (p =.00); Δ R^2 =.09 in step 2 (p = .00); * $p < .05$ ** $p < .01$.

had a higher implicit than explicit self-esteem (negative discrepancy). When participants had a higher explicit than implicit self-esteem (positive discrepancy), the size of the discrepancy did not relate to any of the internalizing symptoms (all p-values > .28). These results indicate that a higher implicit than explicit self-esteem is positively associated with all internalizing symptoms measured.

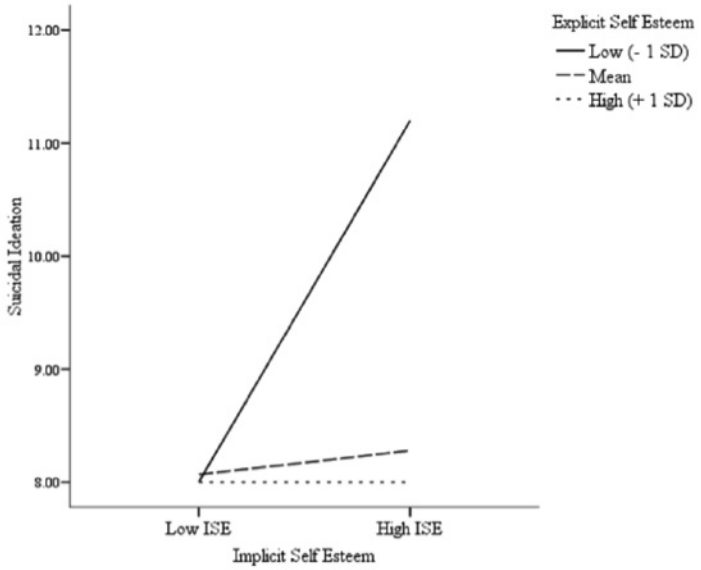

Figure 1 Predicted Values for Suicidal Ideation, Illustrating the Interaction Between Implicit and Explicit Self-Esteem

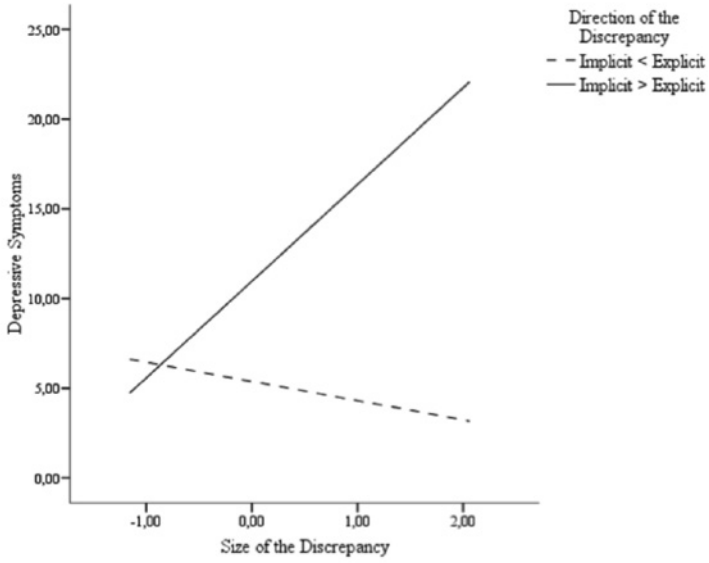

Figure 2 Predicted Values for Depressive Symptoms, Illustrating the Interaction Between the Size of the Discrepancy and the Direction of the Discrepancy

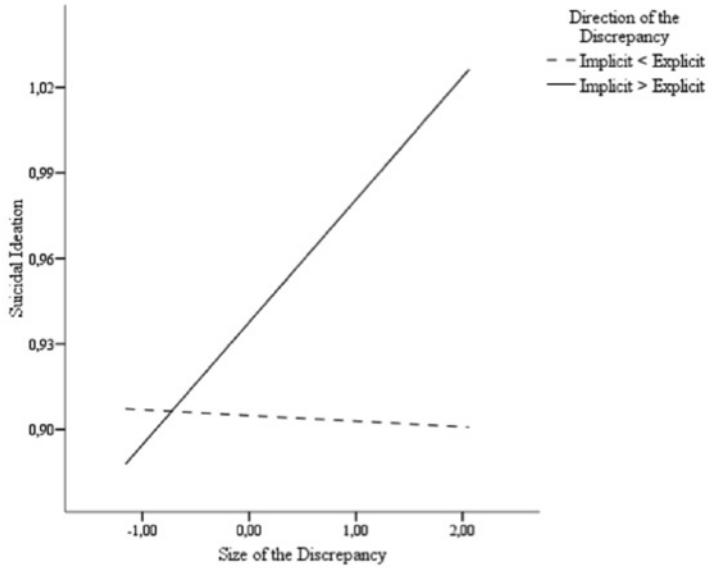

Figure 3 Predicted Values for Suicidal Ideation, Illustrating the Interaction Between the Size of the Discrepancy and the Direction of the Discrepancy

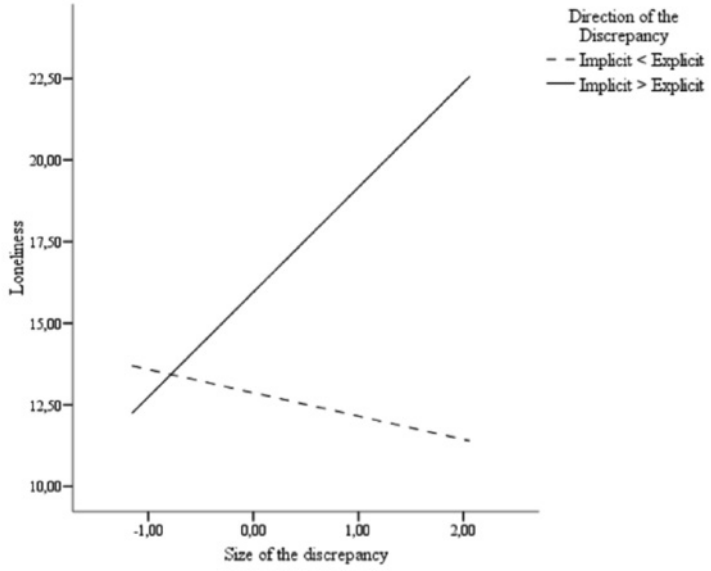

Figure 4 Predicted Values for Loneliness, Illustrating the Interaction Between the Size of the Discrepancy and the Direction of the Discrepancy

Discussion

The objective of this study was to investigate whether explicit self-esteem, implicit self-esteem and their interaction were associated with depressive symptoms, suicidal ideation, and loneliness. Subsequently, we examined the main effects of the discrepancy between explicit and implicit self-esteem and the direction of the discrepancy, as well as the interaction between these measures. The results showed that explicit self-esteem has an inverse relationship with depressive symptoms, suicidal ideation, and loneliness. Implicit self-esteem did not relate to these three internalizing symptoms. The interaction between implicit and explicit self-esteem was associated with suicidal ideation but not with depressive symptoms and loneliness. Furthermore, the size of the discrepancy between implicit and explicit self-esteem was positively associated with depressive symptoms and suicidal ideation. In addition to the associations of the discrepancy size of implicit and explicit self-esteem with depressive symptoms, suicidal ideation, and loneliness, results show that the direction of the discrepancy is an important vulnerability marker for these various internalizing symptoms. More specifically, our findings indicate that damaged self-esteem (high implicit self-esteem combined with low explicit self-esteem) is consistently associated with increased levels of all of these internalizing symptoms.

First, the inverse relationship between explicit self-esteem on the one hand and depression, suicidal ideation, and loneliness on the other hand is not surprising and is in line with previous research (Brage & Meredith, 1994; Evans et al., 2004; Prinstein & La Greca, 2002). According to Cognitive theory (Clark et al., 1999), individuals with low explicit self-esteem show more internalizing symptoms, which may be due to dysfunctional self-schemas existing in memory. Accordingly, self-relevant information is processed in a typical negative manner, which leads to negative self-evaluations and later to depression, suicidal ideation, and loneliness.

Second, we examined the relationship between implicit self-esteem and depressive symptoms, suicidal ideation, and loneliness. The results show that implicit self-esteem was not directly associated with depressive symptoms, suicidal ideation, and loneliness (no main effects). These results are consistent with previous research (De Raedt et al., 2006; Franck, Dereu et al., 2007; Franck, De Houwer et al., 2007; Franck, Barbez et al., 2008; Gemar et al., 2001) finding positive implicit self-esteem within (depressed) individuals in the absence of direct associations with depressive symptoms. Recent research conducted with adolescents (Bos et al., 2010) and children (Huijding, Bos, & Muris, 2011) revealed similar negative results. Several explanations for the lack of relationship between implicit self-esteem and internalizing problems have been proposed. First, Bos et al. (2010) argued that implicit self-esteem might be less susceptible to temporary

development-related stress which is characteristic for adolescence. Research has shown that during adolescence explicit self-esteem tends to decrease (Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002) and psychological problems tends to increase (Costello et al., 2003), whereas it might be possible that implicit self-esteem remains stable. As a result, no association might be present. Second, implicit self-esteem is assumed to be a complex, multi-dimensional construct; therefore, various measures of implicit self-esteem may be addressing different facets of this construct (Koole & Pelham, 2003). It might be possible that implicit self-esteem as conceptualized by the NLT may capture an aspect of implicit self-esteem that is different from the IAT, and is therefore not associated with internalizing problems. In line with this, although De Raedt et al. (2006) found similar positively biased implicit self-esteem in depressed individuals with three different measures of implicit self-esteem, other studies have reported that different measures of implicit self-esteem (e.g. IAT, EAST and NLT) are not correlated with each other (Bosson et al., 2000; Rudolph, Schröder-Abe, Schültz, Gregg, & Sedikides, 2008).

Third, we found that the interaction between implicit and explicit self-esteem was associated with suicidal ideation. More specifically, when participants reported a low explicit self-esteem, their implicit self-esteem was positively related to suicidal ideation. This is an important finding as it emphasizes the importance to study the discrepancy between implicit and explicit self-esteem in order to understand the role of implicit self-esteem in internalizing problems (e.g., suicidal ideation). To our knowledge, this is the first study that investigated the association of the interaction of implicit and explicit self-esteem with suicidal ideation in a nonclinical sample. The results are in line with Franck, Dereu et al. (2007) who found high implicit and low explicit self-esteem in depressed individuals with suicidal ideation. In order to explain these results (see also Franck, Dereu et al., 2007) from the perspective of the entrapment hypothesis (Williams & Pollock, 2000) and the dual-process framework (Brandstädter & Rothermund, 2002), suicidal ideation can be conceptualized as a way of assimilative coping (active coping). It might be possible that people feel entrapped between their goals (i.e., implicit self-esteem) and perceived reality (i.e., explicit self-esteem) and instead of engaging in accommodative coping efforts (adapt goals), they may engage in suicidal ideation as an active way to re-establish an escape route. In support of this, damaged self-esteem (high implicit and low explicit self-esteem) has found to be associated with maladaptive forms of perfectionism (Zeigler-Hill & Terry, 2007) characterized by high fixed goals and standards. Furthermore, suicidal people often show high standards or expectations combined with recent failure (Baumeister, 1990).

Furthermore, the discrepancy between implicit and explicit self-esteem was positively associated with depressive symptoms and suicidal ideation. Thus, young

female adults with a larger discrepancy between their implicit and explicit self-esteem showed more depressive symptoms and suicidal ideation. These results are consistent with previous research (Briñol et al., 2006; Schröder-Abé et al., 2007; Petty et al., 2006) illustrating that discrepancies between implicit and explicit self-esteem relate to dysfunctional outcomes. These significant associations could have important implications for theorizing about self-esteem because conceptual models that only include implicit or explicit self-esteem neglect the effects of the discrepancies between implicit and explicit self-esteem. Further, these findings support the finding of Schröder- Abé, Rudolph et al. (2007), which suggested that the effect of implicit self-esteem depends on the levels of explicit self-esteem of an individual. Results further showed that the direction of the discrepancy is an important vulnerability marker for all measured internalizing symptoms. Damaged self-esteem (high implicit self-esteem combined with low explicit self-esteem) was consistently associated with increased levels of all these internalizing symptoms. This is in line with previous research (Franck, De Houwer et al., 2007; Franck, Dereu et al., 2007; Franck, Barbez et al., 2008) indicating that specifically damaged self-esteem was associated with former depression, current depression, and depression with suicidal ideation. To explain why damaged self-esteem is associated with these internalizing problems, it is possible that the discrepancy between self-relevant goals (i.e., implicit self-esteem) and perceived reality (i.e., explicit self-esteem) form a basis for negative outcomes. More specifically, young adults with suicidal ideation may have high goals (i.e., implicit self-esteem) leading to suicidal thoughts as assimilative coping (cf., Franck, Dereu et al., 2007). With regard to depressive symptoms, these female college students might be able to adjust their goals (accommodative coping) after numerous attempts to change the situation; however, they might have nothing left to strive for if depressive symptoms are the result (cf., Franck, Dereu et al., 2007). Regarding loneliness, which has an important intrapersonal element as it reflects the discrepancy between the perception of one's social relationships and the desired social relationships (Heinrich & Gullone, 2006); implicit self-esteem may be indicative of the desired social relationships (goals), whereas explicit self-esteem may represent the actual social relationships. Future research is needed to examine mechanisms that further explain associations between implicit self-esteem and internalizing problems.

The present study had a number of limitations. First, due to the cross-sectional design of the study, we cannot draw conclusions about causality. Second, our sample consisted only of healthy female college students and future research should reveal whether our findings could be generalized to other groups. Despite these caveats, our study provides new insight into factors that are related to internalizing symptoms.

The present study provides new avenues for future research. Research on self-esteem has focused mainly on explicit self-esteem; however, implicit self-esteem and the discrepancy between implicit and explicit self-esteem has shown to be associated with several negative outcomes. These findings provide further support that implicit self-esteem is an important construct of self-esteem; therefore, conceptual models that include only explicit self-esteem and neglect the effects of implicit self-esteem need to be re-evaluated. In line with this, we emphasize that future research should focus on examining the effect of implicit self-esteem and the discrepancy of implicit and explicit self-esteem on internalizing problems and treatment outcome (e.g. CBT). Next, as argued before (De Houwer et al., 2009; Roefs et al., 2011; Wiers, Teachman, & De Houwer, 2007) measures of implicit cognitive processes need further refinement and validation, both in methodological sense (psychometric properties) and in their specific applications to psychopathology.

Chapter 3

Damaged Self-Esteem is Associated with Internalizing Problems

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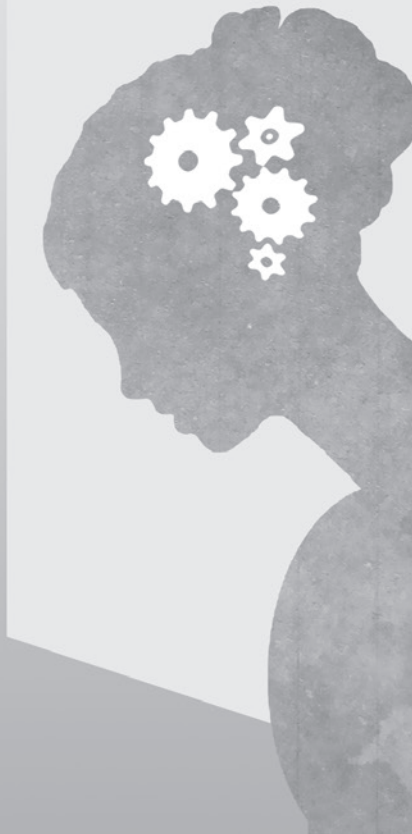

Abstract

Implicit and explicit self-esteem are assumed to be important factors in understanding the onset and maintenance of psychological problems. The current study aims to examine the association between implicit and explicit self-esteem and their interaction with depressive symptoms, suicidal ideation and loneliness. Specifically, the relationship between the *size* and the *direction* of the discrepancy between implicit and explicit self-esteem with depressive symptoms, suicidal ideation and loneliness were examined. Participants were 95 young female adults (M = 21.2 years, SD = 1.88) enrolled in higher education. We administered the IAT to assess implicit self-esteem, and the Rosenberg self-esteem scale to measure explicit self-esteem while psychological problems were assessed through self-reports. Results showed that discrepancies between implicit and explicit self-esteem were positively associated with depressive symptoms, suicidal ideation, and loneliness. In addition, the direction of the discrepancy was specifically relevant: damaged self-esteem (i.e., high implicit self-esteem and low explicit self-esteem) was consistently associated with increased levels of depressive symptoms, suicidal ideation, and loneliness. In contrast, defensive or fragile self-esteem (i.e., low implicit and high explicit self-esteem) was solely associated with loneliness. These findings provide further support that specifically damaged self-esteem is an important vulnerability marker for depressive symptoms, suicidal ideation, and loneliness.

Introduction

Self-esteem plays a crucial role in the onset and maintenance of internalizing problems (Brage & Meredith, 1994; Evans, Hawton, & Rodham, 2004; Harter, 1993; Prinstein & La Greca, 2002). Research has mainly focused on the association of explicit self-esteem with internalizing problems, whereas there is growing evidence that implicit self-esteem might be an important construct to examine in relation to internalizing problems. Implicit self-esteem is defined as relatively automatic, overlearned, and nonconscious evaluation of the self that guides spontaneous reactions to self-relevant stimuli (Greenwald & Banaji, 1995). Implicit self-esteem is a complex, multi-dimensional construct (Koole & Pelham, 2003) and, therefore, it has been argued that various measures of implicit self-esteem may be addressing different facets of this construct. Moreover, in the field of research on implicit and explicit self-esteem results often show that, in addition to its unique associations, the discrepancy between implicit and explicit self-esteem is considered to be relevant for understanding psychopathology. A recent study (Creemers, Scholte, Engels, Prinstein, & Wiers, 2012) showed that discrepancies between implicit and explicit self-esteem were positively associated with depressive symptoms, suicidal ideation, and loneliness. In addition, the direction of the discrepancy has been found to be specifically relevant: damaged self-esteem (high implicit self-esteem and low explicit self-esteem) was related to increased levels of depressive symptoms, suicidal ideation, and loneliness, while defensive or fragile self-esteem (low implicit self-esteem and high explicit self-esteem) was not.

In order to understand how asymmetric changes between implicit and explicit self-esteem develop, dual process models provide a useful theoretical framework. According to recent dual process models, two distinct information-processing modes with different operating principles can be distinguished: the reflective and the associative mode (Epstein, 1994; Gawronski, & Bodenhausen, 2006). Explicit self-esteem reflects a product of the reflective mode, shaped through rational and conscious processing of self-relevant stimuli, whereas implicit self-esteem is assumed to be the outcome of the associative mode, shaped through more automatic, intuitive, unconscious processing of affective experiences (Dijksterhuis, 2006; Epstein & Morling, 1995). As a result of the distinct cognitive processes asymmetric changes (for example, decrease in explicit self-esteem but not in implicit self-esteem) between implicit and explicit self-esteem may occur. It has been proposed that damaged self-esteem in depressed individuals may represent a discrepancy between 'the ideal self' and 'the actual self'. Implicit self-esteem, which is proposed to develop earlier in interaction with primary care givers (e.g., DeHart, Pelham, & Tennen, 2006), may be indicative for the 'ideal self'. Subsequently, explicit self-esteem may be indicative for the more recently formed 'actual self'.

As a result of the discrepancy people may feel entrapped between their goals and 'reality' which in turn may lead to internalizing problems.

Two common measures to assess implicit self-esteem are the Name Letter Task (NLT) and the Implicit Association Test (IAT). Implicit self-esteem as conceptualized by the NLT is supposed to assess an aspect of implicit self esteem that differs from the IAT and, therefore, these two measures are not correlated with each other (Bosson, Swann, & Pennebaker, 2000). Importantly, implicit self-esteem is defined as the relatively automatic, overlearned, and nonconscious evaluation of the self that guides spontaneous reactions to self-relevant stimuli (Greenwald & Banaji, 1995). The finding that both measures of implicit self-esteem are not related might be due to the distinct self-relevant stimuli that are being used in the IAT and NLT. To illustrate, the IAT measures the strength of the association between 'the self' and 'worthless' or 'valuable', while the NLT asses the relative preference for one's own initials assuming these stem from self-associations in memory. Although previous studies showed that both measures of implicit self-esteem were not correlated (Bosson et al., 2000), similar associations between the two measures and internalizing problems were found (e.g. Creemers, et al., 2012; Franck, De Raedt, Dereu & Van Den Abbeele, 2007). This might indicate that both aspects of implicit self-esteem are part of an analogous underlying mechanism that is associated with the onset and development of internalizing problems. Therefore, in order to gain a full perspective of the associations between implicit self-esteem and internalizing problems the use of multiple implicit measures is relevant.

In the Creemers et al. (2012) paper implicit self-esteem was measured with the NLT. In the present study we will report on the associations of implicit self-esteem and explicit self-esteem (and their discrepancy) with psychopathology using different implicit measures. The measures we used to assess implicit self-esteem were two versions of the IAT (Greenwald, McGhee, & Schwartz, 1998; Sriram & Greenwald, 2009). Our aim was to test whether the findings reported in Creemers et al. (2012) could be extended by using these different measures of implicit self-esteem. We hypothesized that specifically damaged self-esteem was associated with internalizing problems.

Methods

Participants

All participants volunteered to participate in the study after informed consent. Participants were ninety-five female undergraduate students of a College for Higher Professional Education, in The Netherlands.[6] Their mean age was 21.2 years (SD = 1.88, Range = 19-30).

6 The same sample as in the Creemers et al. (2012) study was used.

Procedure

Prior to the data collection all participants were told that the experiment examined various predictors of human emotion. First, a computerized implicit measure, the IAT was administered. After completing this task, the computerized explicit self-esteem scale was assessed. Next, participants completed questionnaires on depressive symptoms, suicidal ideation, and loneliness.

Measures

Explicit self-esteem

The Rosenberg self-esteem scale (RSES; Rosenberg, 1965) was used to assess global feelings of self-esteem (e.g., "I feel I do not have much to be proud of"). This self-report questionnaire consists of 10 items measured on a 4-point scale *(totally agree - totally disagree).* Validity and test- retest reliability of the RSES are satisfactory (Franck, De Raedt, Barbez & Rosseel, 2008). Cronbach's α was .87 for the present sample.

Implicit self-esteem

Implicit Association Test (IAT): The IAT measures associations between four categories by pairing two target categories (i.e., me/not-me) with two attribution categories (i.e., valuable/worthless; Greenwald et al., 1998). The underlying assumption of the IAT is that when certain concepts (i.e., valuable and me) are more strongly associated in memory than other concepts (i.e., valuable and not-me), responses are faster when these concepts share a response key. Thus, the faster the response time, the stronger the presumed association is between two categories in memory. In our study, 'valuable' and 'me' sharing one response key, and 'worthless' and 'not-me', sharing another response key, was the compatible block. The incompatible block consisted of 'valuable' and 'not-me' sharing one response key, and 'worthless' and 'me' sharing another response key. The mean difference in reaction times between compatible and incompatible trials is used to estimate the IAT effect: the relative associative strength between the two pairs of concepts. The IAT consisted of seven blocks of trials, and similar stimuli were used as described by Franck et al. (2007). The improved scoring algorithm (Greenwald, Nosek & Banaji, 2003) was used (D600 algorithm) to compute the individual effect size of the subjects. In our study, higher scores indicated higher levels of implicit self-esteem. Past research demonstrated satisfactory reliability and validity of the IAT (Greenwald et al., 1998; Nosek, Greenwald, & Banaji, 2005). The IAT was programmed in Inquisit 3.0 (Millisecond software). As an index of internal consistency for the IAT we computed the correlation between the test and practice blocks. A significant correlation was found ($r = .62$; $p < .001$).

Depressive symptoms

A Dutch version of the *Beck Depression Inventory (BDI-II;* Beck, Steer & Brown, 1996; Van der Does, 2002) was administered to measure the severity of depressive symptoms. Satisfactory validity and psychometric properties of this scale were demonstrated in previous research (Van der Does, 2002). This self-report questionnaire consists of 21 items assessed on a 4-point scale, with items ranging from 0 to 3. Cronbach's α was .89.

Suicidal ideation

Participants completed a Dutch version of the questionnaire developed by Heilbron and Prinstein (2010) to measure suicidal ideation. This self-report measure assesses suicidal thoughts in adolescents and young adults (e.g., "I thought that killing myself would solve my problems"). This scale consists of 16 items measured on a 5-point scale (*never - almost every day)*, and includes a subset of items drawn from the Suicidal Ideation Questionnaire (SIG; Reynolds, 1988) and the NIMH-DISC-IV (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). Cronbach's α was .89.

Loneliness

A short version (R-ULS-8, Roberts, Lewinsohn, & Seeley, 1993) of the revised UCLA Loneliness Scale (R-ULS; Russell, Peplau, & Cutrona, 1980) was used to assess loneliness. Satisfactory construct validity and reliability were found in other adolescent populations (Higbee & Roberts, 1994). This instrument consists of 8-items (e.g., "I feel left out") assessed on a 5-point scale *(I totally disagree – totally agree).* Cronbach's α was .84.

Data Analyses

First, a series of hierarchical multiple regression analyses were performed to examine the relationship between implicit, explicit self-esteem and their interaction with suicidal ideation, depressive symptoms, and loneliness. Implicit and explicit self-esteem were entered in step 1 and their interaction in step 2. Second, we examined the relationship of implicit-explicit discrepancies with depressive symptoms, suicidal ideation and loneliness. The absolute difference between the standardized score on implicit and explicit self-esteem was computed, which indicated the *size* of the discrepancy. A higher score on this variable was indicative for a larger implicit-explicit self-esteem discrepancy. Next, a dummy variable was computed to determine the direction of the discrepancy between implicit and explicit self-esteem (implicit < explicit or implicit > explicit; dummy code). In the present study, 49 participants showed higher implicit than explicit self-esteem, and 46 participants reported higher explicit than implicit self-esteem. In order to examine whether implicit-explicit self-esteem discrepancies were

related to suicidal ideation, depressive symptoms, and loneliness, a series of hierarchical multiple regression analyses were performed. The *size* of the discrepancy and the *direction* of the discrepancy (dummy) were entered in step 1 and their interaction in step 2. As argued in several recent papers (Briñol, Petty, & Wheeler, 2006; Creemers et al., 2012; Schröder-Abé, Rudolph, & Schütz., 2007), these discrepancy analyses are an appropriate manner of specifically testing the associations of implicit-explicit self-esteem discrepancies with internalizing problems.[7] Interactions were tested using the procedure proposed by Aiken and West (1991).

Results

Intercorrelations among the Measures

Descriptive statistics of all study variables were presented in Table 1. The intercorrelations among all study measures are displayed in Table 2. The measures of implicit and explicit self-esteem were weakly correlated. Next, explicit self-esteem was negatively correlated to depressive symptoms, suicidal ideation, and loneliness. Depressive symptoms, suicidal ideation, and loneliness were positively correlated. In addition to the conventional IAT, the Brief IAT (Sriram & Greenwald, 2009) was administered to assess implicit self-esteem. A significant correlation was found between the IAT and Brief IAT (r = .48**). Results of the analyses with the Brief IAT are similar as the presented results with the IAT, and therefore only available in Appendix. Also, in the Appendix analyses are presented (conventional and discrepancy regression analyses) in which we entered 'order of administration' into the regression models to control for 'order effects'. In the conventional regression models we also tested the interaction of 'order of administration' with the predicting instruments. Analyses again show a similar pattern of results (see page 61-63).

Associations with explicit and implicit self-esteem

As presented in Table 3, results of step 1 show that explicit self-esteem significantly predicts unique variance in depressive symptoms (β = - .69, p < .001), suicidal ideation (β = -.44, p < .001), and loneliness (β = - .65, p < .001). No significant associations of implicit self-esteem were found with depressive symptoms (β = -.06, p = .40) suicidal ideation (β = .17, p = .08), and loneliness (β = -.08, p = .31).

7 As described in Creemers et al. (2012), variables of the conventional regression model and the discrepancy regression model need to be examined separately. These are separate models and, therefore, including the main effects of implicit and explicit self-esteem within the discrepancy regression model, would have led to a multicollinearity problem and to uninterpretable results.

Table 1 Descriptive Statistics for Measures of Implicit and Explicit Self-Esteem, Depressive Symptoms, Suicidal Ideation, and Loneliness

	Mean	SD	Range	Min	Max
Impl. Self-Esteem (IAT)	.79	.47	-	-.81	1.86
Expl. Self-Esteem	30.65	4.42	10 - 40	18.00	40.00
Depressive Symptoms	8.29	7.32	00 - 63	.00	34.00
Suicidal Ideation	8.47	1.72	16 - 80	8.00	21.00
Loneliness	14.49	5.46	8 - 40	8.00	30.00

Table 2 Correlations among Measures of Implicit and Explicit Self-Esteem, Depressive Symptoms, Suicidal Ideation, and Loneliness

	1	2	3	4	5
1. Impl. Self-Esteem (IAT)	-				
2. Expl. Self-Esteem	.23*	-			
3. Depressive Symptoms	-.23*	-.70**	-		
4. Suicidal Ideation	.05	-.36**	.38**	-	
5. Loneliness	-.24*	-.67**	.60**	.29**	-

Note: * $p < .05$; ** $p < .01$

Associations of the interaction between implicit and explicit self-esteem

In step 2 we entered the interaction between implicit and explicit self-esteem. Results showed no significant associations of the interaction between implicit and explicit self-esteem with depressive symptoms ($\beta = .07$, $p = .35$), suicidal ideation ($\beta = -.10$, $p = .30$), and loneliness ($\beta = .06$, $p = .50$). Table 3 summarizes the results of the multiple hierarchical regression analyses.

Associations of implicit-explicit discrepancies

First, in participants with damaged self-esteem we found significant correlations between the *size* of the discrepancy and depressive symptoms ($r = .68^{**}$), suicidal ideation ($r = .31^{*}$) and loneliness ($r = .35^{*}$), while in participants with fragile self-esteem no significant correlations were found. Second, a series of multiple hierarchical regression analyses were performed with the *size* of the discrepancy and the *direction* of the discrepancy (dummy coded) entered in step 1, and their interaction entered in step 2 (see text footnote 4). As shown in Table 4, the size of the discrepancy was positively associated with depressive symptoms ($\beta = .28$, $p < .01$),

Table 3 Hierarchical Multiple Regression Analyses: Associations of Explicit Self-esteem, Implicit Self-Esteem, and the Interaction between Implicit and Explicit Self-Esteem with Suicidal Ideation, Depressive Symptoms, and Loneliness

	Suicidal Ideation			Depressive Symptoms			Loneliness		
	B	**SE**	β	**B**	**SE**	β	**B**	**SE**	β
Step 1									
Implicit Self-Esteem	.01	.01	.17	-.06	.08	-.06	-.08	.08	-.08
Explicit Self-Esteem	-.03	.01	-.44**	-.69	.08	-.69**	-.65	.08	-.65**
Step 2									
Implicit Self-Esteem * Explicit Self-Esteem	-.01	.01	-.10	.05	.06	.07	.04	.06	.06

Note: Suicidal ideation R^2 = .18 in step 1 (p =.00); Δ R^2 =.01 in step 2 (p = .31); Depressive Symptoms R^2 =.49 in step 1 (p =.00); Δ R^2 =.01 in step 2 (p = .35); Loneliness R^2 =.46 in step 1 (p =.00); Δ R^2 =.00 in step 2 (p = .49);** p < .01

and suicidal ideation (β = .25, p = .01). There was no significant relationship of the size of the discrepancy with loneliness (β = .05, p = .66). The direction of the discrepancy was significantly associated with suicidal ideation (β = .28, p < .01), whereas no associations with depressive symptoms (β = .14, p = .16) or loneliness (β = .20, p < .06) were found. Moreover, the interaction between the *size* of the discrepancy and the *direction* of the discrepancy was related to depressive symptoms (β = .77, p < .001), suicidal ideation (β = .45, p < .05) and loneliness (β = .60, p < .01). Similarly, as in Creemers et al., (2012), significant associations were found between the *size* of the discrepancy and all measured internalizing problems in participants with damaged self-esteem (higher implicit then explicit self-esteem). Participants with fragile self-esteem (higher explicit then implicit self-esteem) showed no significant associations between the *size* of the discrepancy and depressive symptoms or suicidal ideation. However, we did find that the *size* of the discrepancy was negatively associated with loneliness in participants with fragile self-esteem. In sum, these findings indicate that damaged self-esteem is related to higher levels of depressive symptoms, suicidal ideation and loneliness, whereas fragile self-esteem is solely related to lower levels of loneliness (Figures 1 - 3).

Table 4 Hierarchical Multiple Regression Analyses: Associations of the Size of the Discrepancy, Direction of the Discrepancy, and the Interaction between the Size of the Discrepancy and the Direction of the Discrepancy with Suicidal Ideation, Depressive Symptoms, and Loneliness

	Suicidal Ideation			Depressive Symptoms			Loneliness		
	B	**SE**	β	**B**	**SE**	β	**B**	**SE**	β
Step 1									
Size of the Discrepancy	.02	.01	.25*	.35	.13	.28**	.06	.13	.05
Direction of the Discrepancy	.04	.01	.28**	.28	.20	.14	.39	.21	.20
Step 2									
Size of the Discrepancy * Direction of the Discrepancy	.04	.02	.45*	1.04	.23	.77**	.79	.25	.60**

Note: Suicidal ideation R^2 =.14 in step 1 (p =.00); Δ R^2 =.06 in step 2 (p = .01); Depressive Symptoms R^2 =.09 in step 1 (p =.01); Δ R^2 =.17 in step 2 (p = .00); Loneliness R^2 =.04 in step 1 (p =.15); Δ R^2 =.10 in step 2 (p = .00); * $p < .05$; ** $p < .01$; Direction of the Discrepancy was dummy coded: 0 = fragile self-esteem; 1 = damaged self-esteem.

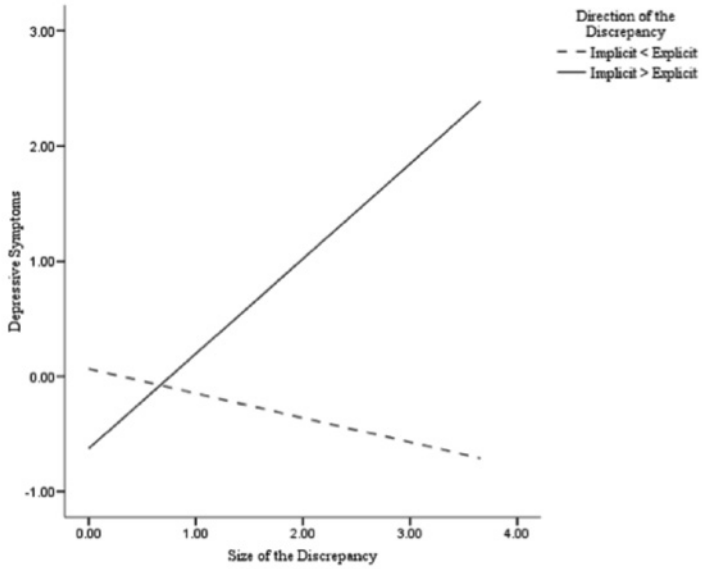

Figure 1 Predicted Values for Depressive Symptoms, Illustrating the Interaction Between the Size of the Discrepancy and the Direction of the Discrepancy

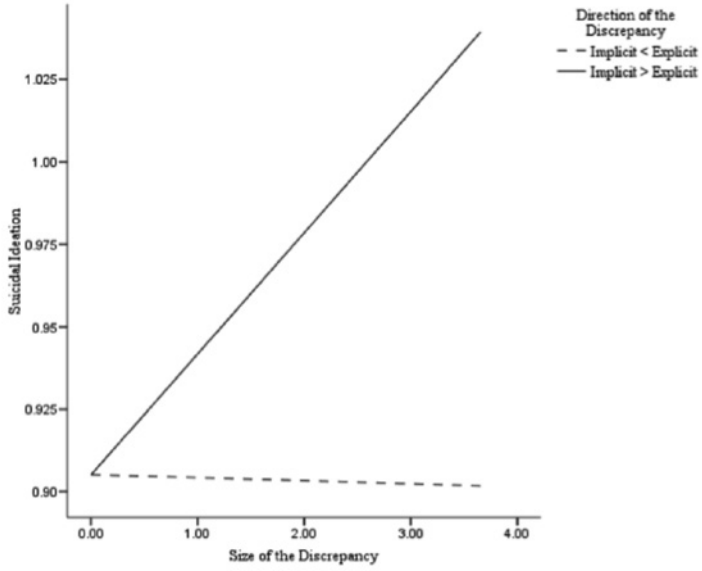

Figure 2 Predicted Values for Suicidal Ideation, Illustrating the Interaction Between the Size of the Discrepancy and the Direction of the Discrepancy

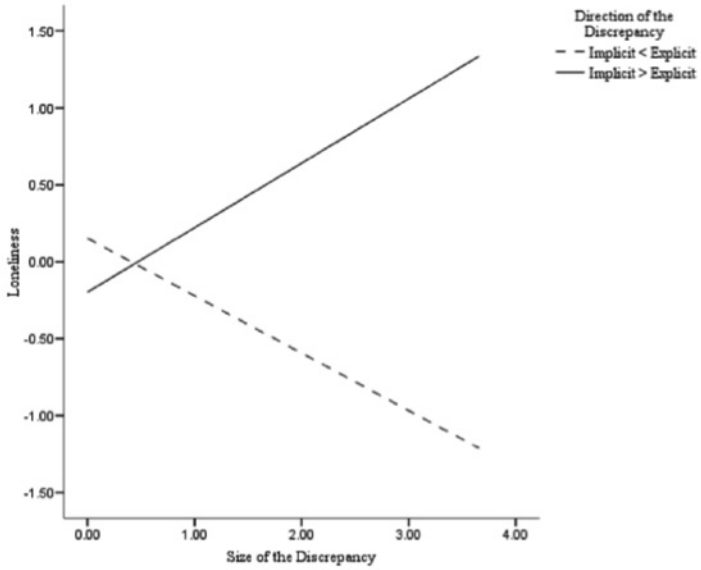

Figure 3 Predicted Values for Loneliness, Illustrating the Interaction Between the Size of the Discrepancy and the Direction of the Discrepancy

Discussion

The main purpose of the present study was to test whether recent findings regarding implicit self-esteem and the discrepancy between implicit and explicit self-esteem as concurrent predictors of internalizing problems (Creemers et al., 2012) could be extended by using a different measure of implicit self esteem. Additional measures to assess implicit self-esteem (i.e., IAT and Brief IAT) were administered and used to validate our findings. Results showed that explicit self-esteem was negatively associated with depressive symptoms, suicidal ideation and loneliness, whereas no unique associations of this assessment of implicit self-esteem with internalizing problems were found. Next, the relationship of the *size* and the *direction* of the discrepancy between implicit and explicit self-esteem, and their interaction with depressive symptoms, suicidal ideation and loneliness were examined. As expected, results showed that the size of the discrepancy was positively associated with all indices of internalizing problems, specifically, in participants with damaged self-esteem (higher implicit than explicit self-esteem). In addition, for participants with defensive or fragile self-esteem (high explicit and low implicit self-esteem) we found that the size of the discrepancy was

negatively associated with loneliness. Importantly, these findings indicate that damaged self-esteem is an important vulnerability marker for the onset and development of internalizing problems.

Overall, these findings confirm previous results that were presented in Creemers et al. (2012), however, they also extend current literature in several aspects. More specifically, our finding that damaged self-esteem is associated with depressive symptoms, suicidal ideation and loneliness when implicit self-esteem is measured with the IAT is relevant. This further supports the assumption that discrepancies between implicit and explicit self-esteem are important to consider for understanding internalizing psychopathology. Subsequently, we think that current findings emphasize the use of implicit measures to examine (implicit) cognitive processes in relation to the maintenance and treatment of internalizing problems. For example, the therapeutic effect of Cognitive Behaviour Therapy (CBT) might be different for individuals with discrepancies between implicit and explicit self-esteem. The enhancement of explicit self-esteem might be useful for individuals with damaged self-esteem (high implicit and low explicit), whereas it might be disadvantageous for individuals with fragile self-esteem (low implicit and high explicit self-esteem). More specifically, it might be possible that individuals with fragile self-esteem have more benefit from interventions that increase implicit self-esteem, because congruent high self-esteem (high implicit and explicit self-esteem) has been found to be an important predictor for psychological wellbeing (e.g. Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003; Kernis, Lakey, & Heppner, 2008). Furthermore, research into mechanisms that enhance the congruence between implicit and explicit self-esteem seems relevant. Recently, Koole, Govorun, Cheng, and Gallucci (2009) found that meditation appears to be effective to reduce implicit-explicit discrepancies (i.e. self-esteem). In addition, mindfulness training is aimed to enhance the clarity of thoughts, feelings, behaviours and sensations of individuals (Brown, Ryan & Creswell, 2007). Since, Chiesa and Serretti (2009) showed that mindfulness training leads to decreased levels of stress, it might be of interest to examine the effect of mindfulness training on implicit-explicit discrepancies.

One limitation of the present study is that as a result of the cross-sectional design no conclusions with regard to causality can be drawn from this study. Furthermore, the sample consisted only of healthy young woman and future research should examine whether our findings can be generalized to other groups.

Appendix

Results of the conventional regression analyses and the discrepancy analyses when implicit self-esteem is measured with the Brief-IAT.

Table 5 Hierarchical Multiple Regression Analyses: Associations of Explicit Self-esteem, Implicit Self-Esteem (Brief-IAT), and the Interaction between Implicit and Explicit Self-Esteem with Suicidal Ideation, Depressive Symptoms, and Loneliness

	Suicidal Ideation			Depressive Symptoms			Loneliness		
	B	**SE**	β	**B**	**SE**	β	**B**	**SE**	β
Step 1									
Implicit Self-Esteem	.01	.01	.19 †	.06	.08	.06	-.08	.08	-.08
Explicit Self-Esteem	-.03	.01	-.45**	-.72	.08	-.72**	-.65	.08	-.65**
Step 2									
Implicit Self-Esteem * Explicit Self-Esteem	-.01	.01	-.11	.08	.06	.11	.09	.06	.11

Note: Suicidal ideation R^2 =.18 in step 1 (p =.00); Δ R^2 =.01 in step 2 (p = .26); Depressive Symptoms R^2 =.49 in step 1 (p =.00); Δ R^2 =.01 in step 2 (p = .16); Loneliness R^2 =.46 in step 1 (p =.00); Δ R^2 =.01 in step 2 (p = .15); * $p < .05$ ** $p < .01$, †p = .053.

In the following paragraphs results of additional analyses will be presented *controlling for administration order* of the implicit measures (NLT, IAT) that were described in Chapters 2 and 3. In the conventional regression models we additionally entered in step 1 OrderNLT, in step 2 the interaction of OrderNLT with RSES and the interaction of OrderNLT with NLT, and in step 3 we added the three-way interaction between OrderNLT, RSES and NLT (same analyses were performed for IAT with variable OrderIAT). The value of this OrderNLT and OrderIAT variable reflects the moment this specific task was administered. With regard to the discrepancy regression analyses we entered OrderNLT or OrderIAT in step 1 to control for administration order. In the discrepancy analyses we did not test interactions with OrderIAT or OrderNLT because this would have led to difficult results to interpret. We were not able to perform these analyses for the Brief IAT because this was always the final task that was assessed.

Table 6 Hierarchical Multiple Regression Analyses: Associations of the Size of the Discrepancy, Direction of the Discrepancy, and the Interaction between the Size of the Discrepancy and the Direction of the Discrepancy with Suicidal Ideation, Depressive Symptoms, and Loneliness

	Suicidal Ideation			Depressive Symptoms			Loneliness		
	B	SE	β	B	SE	β	B	SE	β
Step 1									
Size of the Discrepancy	.03	.01	.35**	.35	.13	.26**	.09	.14	.06
Direction of the Discrepancy	.03	.01	.22*	.65	.19	.33**	.43	.20	.21*
Step 2									
Size of the Discrepancy * Direction of the Discrepancy	.04	.02	.53*	.75	.27	.59**	.79	.29	.61**

Note: Suicidal ideation R^2 =.16 in step 1 (p =.00); Δ R^2 =.05 in step 2 (p = .02); Depressive Symptoms R^2 =.17 in step 1 (p =.00); Δ R^2 =.06 in step 2 (p = .01); Loneliness R^2 =.05 in step 1 (p =.09); Δ R^2 =.07 in step 2 (p = .01); * p < .05 ** p < .01. Direction of the Discrepancy was dummy coded: 0 = fragile self-esteem; 1 = damaged self-esteem.

Associations of explicit and implicit self-esteem and their interaction

To examine whether explicit and implicit self-esteem (NLT, IAT) were associated with depressive symptoms, suicidal ideation, and loneliness when controlling for 'order of administration' of the implicit measures, we conducted a series of hierarchical multiple regression analyses. When using the NLT as measure of implicit self-esteem; the results of step 1 show a negative association of explicit self-esteem with depressive symptoms (β = -0.70, p < 0.001), suicidal ideation (β = -0.39, p < 0.001), and loneliness (β = -0.69, p < 0.001). No significant direct associations (i.e. main effect) of NLT with depressive symptoms (β = 0.04, ns.) suicidal ideation (β = 0.16, ns.), and loneliness (β = -0.12, ns) were found. Also, OrderNLT was not significantly related to the outcome measures (depressive symptoms, β = -0.06, ns.; suicidal ideation, β = -0.11, ns.; loneliness, β = -0.08, ns). The results of step 2 show no significant associations of the interaction between implicit (NLT) and explicit self-esteem with depressive symptoms (β = -0.04, ns.) and loneliness (β = -0.08, ns.). The interaction between implicit (NLT) and explicit self-esteem associated significantly with suicidal ideation (β = -0.28, p < 0.01). The interaction between

NLT and OrderNLT was not related to depressive symptoms (β = -0.02, ns.), suicidal ideation (β = -0.12, ns.) and loneliness (β = -0.03, ns.). Similarly, the interaction between RSES and OrderNLT was not related to depressive symptoms (β = -0.00, ns.), suicidal ideation (β = 0.08, ns.) and loneliness (β = -0.04, ns.). Finally, the three-way-interaction between NLT, RSES and OrderNLT was not associated with depressive symptoms (β = 0.05, ns.), suicidal ideation (β = 0.15, ns.) and loneliness (β = 0.02, ns.).

When using the IAT as measure of implicit self-esteem; the results of step 1 show a negative association of explicit self-esteem with depressive symptoms (β = -0.69, p < 0.001), suicidal ideation (β = -0.44, p < 0.001), and loneliness (β = -0.65, p < 0.001). No significant direct associations (i.e. main effect) of IAT with depressive symptoms (β = -0.06, ns.) suicidal ideation (β = 0.17, ns.), and loneliness (β = -0.08, ns) were found. Also, OrderIAT was not significantly related to the outcome measures (depressive symptoms, β = 0.00, ns.; suicidal ideation, β = -0.01, ns.; loneliness, β = -0.01, ns). The results of step 2 show no significant associations of the interaction between implicit (IAT) and explicit self-esteem with depressive symptoms (β = 0.10, ns.), suicidal ideation (β = -0.08, ns) and loneliness (β = 0.04, ns.). The interaction between IAT and OrderIAT was not related to depressive symptoms (β = -0.13, ns.), suicidal ideation (β = 0.03, ns.) and loneliness (β = -0.06, ns.). Similarly, the interaction between RSES and OrderIAT was not related to depressive symptoms (β = 0.15, ns.), suicidal ideation (β = 0.02, ns.) and loneliness (β = 0.02, ns.). Finally, the three-way-interaction between IAT, RSES and OrderIAT was significantly associated with depressive symptoms (β = 0.26, p = .02), but not with suicidal ideation (β = -0.20, ns.) and loneliness (β = 0.02, ns.).

Associations of implicit-explicit discrepancies

Next, we next conducted a series of multiple hierarchical regression analyses to determine whether the size of the discrepancy, the direction of the discrepancy and their interaction relates to depressive symptoms, suicidal ideation, and loneliness when controlling for 'order of administration' of the implicit measures. When using the NLT as implicit measure: the results of step 1 showed that the size of the discrepancy was positively related to depressive symptoms (β = 0.22, $p < 0.05$) and suicidal ideation (β = 0.25, $p < 0.05$). We found no significant association between the size of the discrepancy and loneliness (β = 0.17, $p = 0.09$). The direction of the discrepancy was significantly related to all three internalizing symptoms (depressive symptoms β = 0.39, $p < 0.001$; suicidal ideation, β = 0.27, $p < 0.01$; loneliness, β = 0.28, $p < 0.01$). In addition, the results of step 2 showed that the interaction between the size of the discrepancy and the direction of the discrepancy was significantly associated with all three internalizing symptoms (depressive symptoms, β = 0.51, $p < 0.01$; suicidal ideation, β = 0.42, $p < .01$; loneliness, β = 0.42,

$p < 0.01$). In all analyses, OrderNLT was not significantly related to the outcome measure (lowest p = .62).

When using the IAT as implicit measure: the results of step 1 showed that the size of the discrepancy was positively related to depressive symptoms ($\beta = 0.27$, $p < 0.01$) and suicidal ideation ($\beta = 0.25$, $p < 0.05$). We found no significant association between the size of the discrepancy and loneliness ($\beta = 0.04$, $p = 0.68$). The direction of the discrepancy was significantly related to suicidal ideation ($\beta = 0.28$, $p < 0.01$). We found no significant associations between the direction of the discrepancy depressive symptoms ($\beta = 0.15$, $p = .15$) and loneliness ($\beta = 0.20$, $p = 0.05$). In addition, the results of step 2 showed that the interaction between the size of the discrepancy and the direction of the discrepancy was significantly associated with all three internalizing symptoms (depressive symptoms, $\beta = 0.78$, $p < 0.001$; suicidal ideation, $\beta = 0.45$, $p < .05$; loneliness, $\beta = 0.60$, $p < 0.01$). In all analyses, OrderIAT was not significantly related to the outcome measure (lowest p = .64).

Chapter 4

Acute Stress Increases Implicit Depression and Decreases Implicit Self-Esteem

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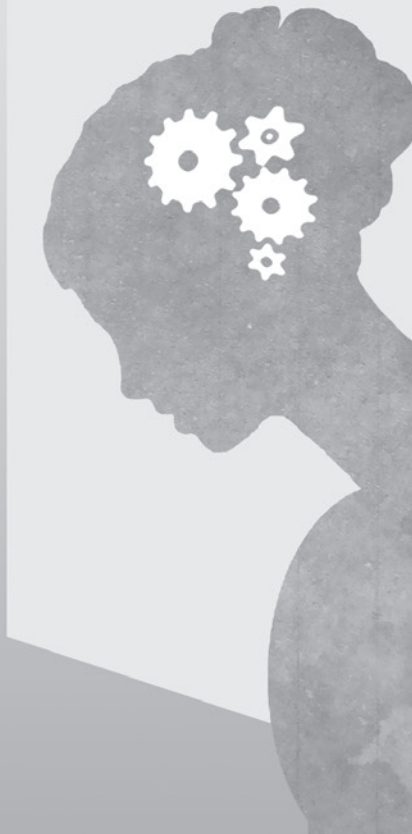

Abstract

According to cognitive theories, internalizing problems are the result of the activation of dysfunctional attitudes (e.g., negative self-thoughts) in memory in response to stressful life events. Dual process models posit that associative and reflective cognitive processes may respond differently to stressful life events and may affect the development of psychopathology. According to these models, self-relevant stimuli activate both associative and reflective processes. However, previous research has focused mainly on reflective processes using explicit assessment instruments. The main aim of the present study was to examine the effect of acute stress on both associative and reflective cognitive processes by using implicit and explicit measures of self-esteem and depression. Participants were 95 university students (M = 23.3 years, SD = .37, 79 females). Implicit and explicit measures of self-esteem and depression were administered before and after a stress-induction procedure. The results showed that acute stress increased implicit depression ($p < .01$) and decreased implicit self-esteem ($p < .05$) but did not affect explicit measures of self-esteem and depression (*p-values* ≥ .44). Together, these findings offer new insights into the relationship of stress with implicit and explicit attitudes and provide experimental support for dual process models.

Introduction

Theorists have proposed that cognitive processes that emerge in response to stressful life events play an important role in the onset, maintenance and treatment of psychopathology (Beck, Rush, Shaw, & Emery, 1979; Clark, Beck, & Alford, 1999). More recently, dual process models have distinguished between two information-processing modes with different operating principles, the reflective and the associative mode (Beevers, 2005; Gawronski & Bodenhausen, 2006; Smith & DeCoster, 2000; Strack & Deutsch, 2004). The reflective mode represents a rule-based, rational, conscious, intentional, slow and effortful manner of information processing. In contrast, associative processing is characterized by a more automatic, unconscious, uncontrollable, unintentional and efficient way of processing. These features of associative processing can co-occur, or they can be activated independently (Bargh, 1994; De Houwer et al., 2009). Importantly, both associative and reflective processes are proposed to work in concert and thus interact in order to evaluate the world (Cunningham & Zelazo, 2007). According to dual process theories, associative (e.g., implicit self-esteem) and reflective (e.g., explicit self-esteem) processes can differ in their effect on the development of psychopathology, health, and reactions to stressful life events (Beevers, 2005; Haeffel et al., 2007; Hofmann, Friese, & Wiers, 2008; Wiers et al., 2007). However, experimental research on the effect of stress on associative and reflective cognitive processes is still scarce. Therefore, the main purpose of the present study was to examine the effect of stress on implicit and explicit measures of self-esteem and depression.

According to cognitive theories, internalizing problems (e.g., depression, anxiety) result from activation of dysfunctional attitudes existing in memory in response to stressful life events (Beck et al., 1979; Clark et al., 1999). Based on early life experiences, attitudes develop and become stable cognitive structures that shape emotions, thoughts, and behaviour of individuals. To date, studies have concentrated mainly on attitudes that are explicit in the sense that they are available to conscious introspection. These attitudes have usually been assessed through self-report measures (i.e., questionnaires). However, research on explicit attitudes has its shortcomings because activated attitudes may not always be accessible through conscious introspection (Young, 1994). Moreover, self-report measures are sensitive to social desirability and individuals may sometimes dismiss relevant attitudes as irrelevant (Schwarz, 1999; Schwarz & Oyserman, 2001).

It has been suggested that implicit attitudes may play a complementary role in understanding human behaviour and the development of psychopathology (Franck, De Raedt, Dereu, & Van den Abbeele, 2007; Roefs et al., 2011). Implicit

attitudes are measured in an indirect way and are assumed to reflect automatic reactions to specific associations in memory (Gawronski & Bodenhausen, 2006). Implicit attitudes are more likely to be unconscious, unintentional, and uncontrollable compared to explicit attitudes (Bargh, 1994). Dual process models provide a useful cognitive framework for understanding the differences between explicit and implicit attitudes and posit that both attitudes stem from different cognitive processes (Epstein, 1994; Gawronski & Bodenhausen, 2006). Explicit attitudes (e.g., explicit self-esteem) represent products of the reflective processing mode shaped through rational and conscious processing, whereas implicit attitudes refer to the associative processing mode shaped through automatic, intuitive, and unintentional processing. Gawronski and Bodenhausen (2006) argued that both information-processing modes with different operating principles operate simultaneously, possibly leading to *different* explicit and implicit attitudes towards the same event. Building on these models, Haeffel et al. (2007) developed a dual-process theory of cognitive vulnerability to depression, where distinct cognitive processes differ in their effects on depressive reactions to stressful life events. They argued that associative processes (in their work referred to as implicit processes) are crucial in the determination of a direct affective response to stress, whereas reflective processes are assumed to be crucial in long-term depressive reactions and represent the final interpretation of stressful life events. Although these dual process models emphasize the differences between associative and reflective processing, both processing modes do not operate independently or separately from each other. Recently, the Iterative Reprocessing model (Cunningham & Zelazo, 2007) was designed to consider the interaction between associative and reflective processes. The IR-model suggests a continuum ranging from relatively automatic processing to controlled reflective processing. Cunningham and Zelazo (2007) highlighted the recursive nature of both processes and posited that the outcome of initial automatic processing is used in subsequent reflective processing (see also Strack & Deutsch, 2004; Gladwin, Figner, Crone, & Wiers, 2011). Additionally, information from reflective processes can be sent back to associative processes in order to reinterpret the evaluation of the stimulus or event (i.e., 'reseeding the evaluative cycle'). As a result of the complex and multifaceted nature of cognitive processing, we emphasize that conceptual models on the effects of stress need to include both reflective and associative processing to further understand mechanisms that lead to psychopathology, while acknowledging that neither class of measures is process-pure (see also Sherman et al., 2008).

Stress is assumed to activate dysfunctional attitudes in memory, which in turn may lead to depression (Beck et al. 1979). Previous studies showed that stressful life events involving loss, humiliation or defeat influence the onset and maintenance of depression (Brown, 1998; Kendler, Karkowski, & Prescott, 1999;

Pine, Cohen, Johnson, & Brook, 2002). More specifically, stressful situations are assumed to potentially demean one's image or social self, and they have been found to activate various psychological and physiological responses (Gruenewald, Kemeny, Aziz, & Fahey, 2004). For example, events that are experienced as a threat to the social self (e.g., evaluative situations, such as speech tasks) decrease self-esteem, increase feelings of shame, intensify humiliation, and increase cortisol levels (Dickerson, Gruenewald, & Kemeny, 2004). To date, few experimental studies examined the effect of stress on implicit self-attitudes. To conceptualize implicit self-attitudes and to understand associative cognitive processes and their role in psychopathology, measures of implicit self-esteem and implicit depression may be highly relevant. Because activated dysfunctional *self-attitudes* increase the risk for depression (Beck et al., 1979), it is relevant to assess implicit attitudes towards 'self-worth' (i.e., implicit self-esteem) and the tendency to associate the self with sadness (i.e., implicit depression) in response to a stressful event. Gemar, Segal, Sagrati, and Kennedy (2001) examined implicit self-esteem of participants with former depression, current depression, and healthy controls before and after a negative *mood induction*. The results indicated that formerly depressed individuals showed a decrease in implicit-self-esteem after a negative mood-induction, whereas implicit self-esteem in healthy controls did not change. Subsequently, Franck, De Raedt, and De Houwer (2008) replicated these findings. Other studies revealed that implicit self-attitudes (e.g., implicit self-esteem and implicit anxiety) can be modified through evaluative conditioning (Baccus, Baldwin, & Packer 2004; Clerkin & Teachman, 2010) and Cognitive Behaviour Therapy (Teachman, Marker, & Smith-Janik, 2008). In addition, a negative mood induction was found to increase implicit depression in controls but not in formerly depressed individuals (Meites, Deveney, Steele, Holmes, & Pizzagalli, 2008). To the best of our knowledge, this is the first study that examines the effect of acute stress on *both* implicit and explicit measures of self-esteem *and* depression. Since stress is an important vulnerability marker for the onset of depression (Pine et al., 2002), examining changes in implicit and explicit attitudes after inducing stress is relevant. Subsequently, this allows us to determine the range of cognitive functions affected by stress more accurately.

In sum, the present study aims to examine the effect of stress on both implicit and explicit measures of self-esteem and depression. Because implicit attitudes represent the initial quick associative responses to stress, we hypothesize that implicit measures of depression and self-esteem will be negatively biased as a result of acute stress. Similarly, because stress is assumed to affect reflective processing (Beevers, 2005; Bosch et al., 2009; Gruenewald et al., 2004), we expect increases in depressive symptoms and decreases in explicit self-esteem as a result of acute stress.

Methods

Participants

Ninety-five university students from the Faculty of Social Sciences at the Radboud University Nijmegen, The Netherlands, participated in this study. The sample consisted of 79 women and 16 men. The mean age of the participants was 23.3 years (*SD* = .37). The stress induction group consisted of 46 participants, 37 women and 9 men (mean age = 23.57; *SD* = 4.12). The control group consisted of 49 participants, 42 women and 7 men (mean age = 23.02; *SD* = 2.87). Students participated voluntarily in the study and received either a course credit or a gift coupon worth € 10,-.

Procedure

Figure 1 presents an overview of the stress induction procedure. Participants were invited to the laboratory and were randomly assigned to either a "stress" or a "control" condition. Participants in both groups were seated in a cubicle with a laptop in front of them. Subsequently, they received general instructions from the experimenter and signed the informed consent form. The experimenter informed subjects in both groups about the fact that they might be asked to give a speech in front of a camera. Next, they were informed that they would be asked to report their mood repeatedly and to complete questionnaires and computerized tasks. Immediately after that, participants completed the computerized Initial Preference Task (NLT) and the depression-IAT on the laptop (implicit before explicit assessment, cf. Bosson, Swann, & Pennebaker, 2000). Subsequently, participants completed the State version of the Spielberger State/Trait Anxiety Inventory (STAI state), the State Self Esteem Scale (SSES), and the Centre for Epidemiological Studies Depression Scale (CES-D). Subsequently, the stress induction group was given the Dutch translation of a "stress induction paradigm" by Field and Powell (2007) but the control group was not.[8] That is, participants were asked to prepare to give a speech on the war in Iraq on camera in the presence of the experimenter. Subjects in the control group were informed that they did not have to give a presentation. Instead, they were given 2 minutes to solve anagrams designed with the intention to be easily solvable. Afterwards, all participants completed the computerized NLT and the depression-IAT. Finally, the STAI state, the SSES, and the CES-D were

8 The following standardized instructions (cf. Field & Powell, 2007) were used for the stress induction group: 'One part of the experiment is designed to assess your social skills and public speaking ability. You will shortly be asked to give a short speech in front of a video camera, in which you will outline your views on the war in Iraq. I will stay here to watch you present the speech and rate you on several different measures of effectiveness. The recording will then be presented to other psychologists within the department later so they can make similar ratings'. The experimenter then attached a webcam to the PC and stated, 'I am attaching the camera now so that you can get used to it, but I will not start recording until you present your speech at the end of the session.'

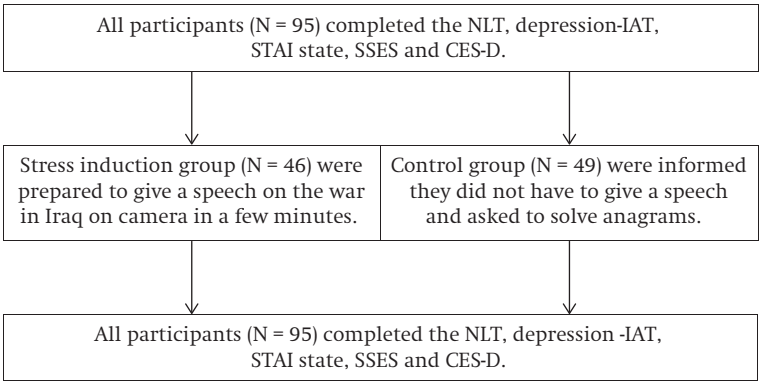

Figure 1 A schematic overview of the stress-induction procedure

administered again. At the end of the session, participants in the stress induction group were told that they were not expected to give a speech in front of the camera. Four participants were excluded from the analyses because they were familiar with the stress-induction procedure. As a reward, participants received either course credit or a gift coupon worth € 10,-.

Measures

Anxiety

To perform the manipulation check, we used the State version of the Spielberger State/Trait Anxiety Inventory (STAI State; Spielberger, 1983) to assess state anxiety (e.g., 'I am afraid'). The instrument consists of 20 items measured on a 4-point scale *(extremely – not at all).* Higher score reflects greater anxiety. Reliability estimates of the State anxiety scale have been found to be satisfactory (Barnes, Harp, & Jung, 2002). Cronbach's α was .95 both before and after the stress-induction procedure.

Explicit self-esteem

The State Self Esteem Scale (SSES; Heatherton & Polivy, 1991) was used to assess state self-esteem (e.g., 'I feel confident about my abilities'). This instrument consists of 20 items measured on a 5-point scale *(extremely – not at all)* and has three subscales assessing performance-, social-, and appearance self-esteem. In our study, we used the total score as an index of explicit self-esteem. Past research demonstrated good psychometric properties (Heatherton & Polivy, 1991). Cronbach's α was .90 before and .91 after the stress-induction procedure.

Depressive symptoms

The Dutch version of the Centre for Epidemiological Studies-Depression scale (CES-D; Faulstich, Carey, Ruggiero, Enyart, & Gresham, 1986) was used to assess the existence and severity of depressive symptoms in our sample (e.g., "I felt hopeful about the future"). It consists of 20 self-report items measured on a 4-point scale *(rarely or none of the time - most of or all the time).* The total score ranged from 0 (no depressive symptoms at all) to 60 (many depressive symptoms). The CES-D is a widely used instrument for assessing depressive symptoms and it has shown high validity and reliability (e.g., Garrison, Addy, Jackson, McKeown, & Waller, 1991; Roberts, Lewinsohn, & Seeley, 1991). Cronbach's α was .92 before and .93 after the stress-induction.

Implicit self-esteem

To measure implicit self-esteem, a computerized version of the *Name Letter Task* (NLT; Nuttin, 1985) was administered. Each letter of the alphabet was displayed only once separately in a random order in the centre of the screen and participants were asked, "How much do you like this letter?" Participants evaluated each letter on a 7-point scale *(dislike very much - like very much).* They were instructed to work quickly and to follow their first intuitive reactions. There was no response window. The *Name Letter Task* is based on the assumption that the initials of an individual's name are closely associated with the self (Nuttin, 1985) and that the relative liking of one's own initials, in comparison with the liking of the other letters of the alphabet, therefore reflects someone's implicit self-attitudes. Because participants were unaware of the logic behind the task, the evaluation of people's own initials can be qualified as an index of implicit self-esteem (Greenwald & Banaji, 1995). Past research has demonstrated the reliability and validity of the NLT (Bosson et al., 2000; Koole & Pelham, 2003). The experiment in the present study was programmed using Inquisit Millisecond software. *The Baseline-corrected algorithm (B-algorithm)* was used to compute the index of implicit self-esteem (LeBel & Gawronski, 2009). In this algorithm, we calculated the normative letter baselines by computing the average letter ratings for participants whose initials did not include the letter. Next, we computed the difference scores between the participants' mean ratings of their initials and the letter baselines (mean ratings of non-initials). The letter baselines were subtracted from the mean ratings of initials. Higher scores indicated higher levels of implicit self-esteem. This algorithm controls for baseline differences in the attractiveness of letters (Bornstein, 1989) and visual features of different letters (Duckworth, Bargh, Garcia, & Chaiken, 2002).

Implicit depression

Implicit depression was assessed with the Implicit Association Test (IAT). The IAT assesses differential associations between four categories by pairing two target

categories (i.e., me/not-me) with two attribution categories (i.e., happy/sad; Greenwald, McGhee, & Schwartz, 1998). The general idea behind the IAT is that whenever certain concepts (i.e., sad and me) are associated in memory more strongly than other concepts (i.e., sad and not-me), people will respond more rapidly when these concepts share a response key. Faster response time indicates stronger presumed association between two categories. The IAT effect represents the mean difference in reaction time between compatible and incompatible trials. In our study, 'happy' and 'me' sharing one response key and 'sad' and 'not-me' sharing another response key was the compatible trial. The incompatible trial consisted of 'happy' and 'not-me' sharing one response key and 'sad' and 'me' sharing another response key. The IAT consisted of seven blocks of trials using similar stimuli (see Appendix), as described by Meites and colleagues (2008). The improved scoring algorithm, as described by Greenwald, Nosek, and Banaji (2003), was used (D measures) to compute the individual effect size of the participants. In our study, lower scores indicated higher levels of implicit depression (i.e., lower positive bias). Past research has demonstrated acceptable reliability and validity of the IAT (Greenwald et al., 1998; Nosek, Greenwald, & Banaji, 2005). The IAT was programmed in Inquisit 3.0 (Millisecond software).

Plan of analyses

First, participants in the stress and control condition were compared on demographic data (gender, age, ethnicity) using one-way ANOVAs. We checked our manipulation procedure using a Repeated Measures ANOVA with before and after manipulation as within subjects' factor and state anxiety (STAI-state) as dependent variable. Next, to test the effect of stress-induction on explicit measures, 2 × 2 ANOVAs were performed separately for the SSES and CES-D. *Group* (Stress or Control) was used as the between-subjects factor and *Time* (before and after the manipulation procedure) as the within-subjects factor. Subsequently, similar *Group* × *Time* ANOVAs were applied separately for both implicit measures, the NLT-score and the D-value of the Depression-IAT. In order to examine significant ANOVA effects, we performed post-hoc paired samples *t-tests* on participants in the control- and stress-induction group separately.

Results

Group Differences on Baseline

Participants assigned to the stress induction group and control group did not differ with respect to gender, anxiety, ethnicity, and age (all *p*-values > .31). Furthermore, no significant group differences emerged in explicit self-esteem,

implicit self-esteem, depressive symptoms, and implicit depression (all *p*-values > .13) before the manipulation procedure. Table 1 shows the descriptive statistics of all primary variables before and after the experimental procedure for both the experimental and control group.

Table 1 Descriptive Statistics for Implicit and Explicit Measures of Self-Esteem and Depression Before and After the Experimental Procedure

	Stress induction group		Control group	
	Mean	SD	Mean	SD
Implicit Self-Esteem:				
before experimental procedure	1.10	1.10	1.10	1.01
after experimental procedure	.94	1.17	1.21	1.10
Explicit Self-Esteem:				
before experimental procedure	73.61	12.36	74.18	10.53
after experimental procedure	74.50	12.82	75.41	12.34
Implicit Depression:				
before experimental procedure	.63	.49	.48	.47
after experimental procedure	.44	.41	.54	.34
Explicit Depression:				
before experimental procedure	12.19	10.00	10.22	8.18
after experimental procedure	12.90	10.75	11.50	8.75

Relationship between implicit and explicit measures

Table 2 shows that prior to the manipulation procedure, both implicit measures (i.e., NLT and depression IAT) correlated weakly with each other ($r = .33$, $p < .01$), indicating that higher levels of implicit self-esteem were significantly associated with lower levels of implicit depression (i.e., lower positive bias). After the manipulation procedure, implicit self-esteem did not correlate with implicit depression ($r = .17$, $p = .11$). Furthermore, before the manipulation procedure, weak correlations were found between implicit- and explicit self-esteem ($r = .25$, $p < .05$) and between implicit- and explicit depression ($r = -.23$, $p < 0.05$). After the manipulation procedure, a weak correlation was found between implicit - and explicit self-esteem again ($r = .28$, $p < .01$), whereas no correlation was found between implicit- and explicit depression ($r = -.04$, $p = .70$).

Table 2 Correlations among Implicit and Explicit Measures of Self-Esteem and Depressive Symptoms

	1	2	3	4	5	6	7	8
1. NLT (before SI)	-							
2. NLT (after SI)	.85**	-						
3. IAT depr. (before SI)	.33**	.25*	-					
4. IAT depr. (after SI)	.22*	.17	.50**	-				
5. SSES (before SI)	.25*	.25*	.31**	.15	-			
6. SSES (after SI)	.29**	.28**	.41**	.21	.95**	-		
7. CES-D (before SI)	-.10	-.13	-.23*	-.14	-.69**	-.71**	-	
8. CES-D (after SI)	-.08	-.12	-.19	-.04	-.70**	-.75**	.93**	-

Note: * $p < .05$; ** $p < .01$; NLT: Name Letter Task; IAT depr.: Implicit Association Task depression; SSES: State Self-Esteem Scale; CES-D: Center for Epidemiological Studies-Depression Scale; SI: Stress Induction

Manipulation check

Anxiety (STAI-State)

The repeated measures ANOVA showed that the main effect of *Group* was not significant, $F(1, 91) = 2.18$, $p = .14$, partial $\eta^2 = .023$. The result indicated a significant main effect of *Time*, $F(1, 91) = 15.04$, $p < .01$, partial $\eta^2 = .142$, which was qualified by the significant interaction between *Time* and *Group*, $F(1, 91) = 7.31$, $p < .01$, Partial $\eta^2 = .07$. Post-hoc independent samples *t-test* showed no significant group differences at post-test, $t(92) = -1.80$, $p = .08$. Furthermore, in order to examine the interaction effect, paired samples *t-tests* were performed separately for the stress-induction and control group. As can be seen in Figure 2, participants in the stress-induction group showed elevated STAI state scores after the experimental manipulation compared to before the manipulation $t(45) = -3.78$, $p < .001$, whereas in the control group no change occurred $t(46) = -1.17$, $p = .25$. Thus, the manipulation was successful.

Effect of Stress Induction on Implicit Measures

Implicit self esteem

To test the effect of stress-induction on implicit self-esteem, 2 × 2 ANOVAs were performed with *Time* (before and after the manipulation procedure) as within subject factor and *Group* (Stress or Control) as between subject factor. Implicit

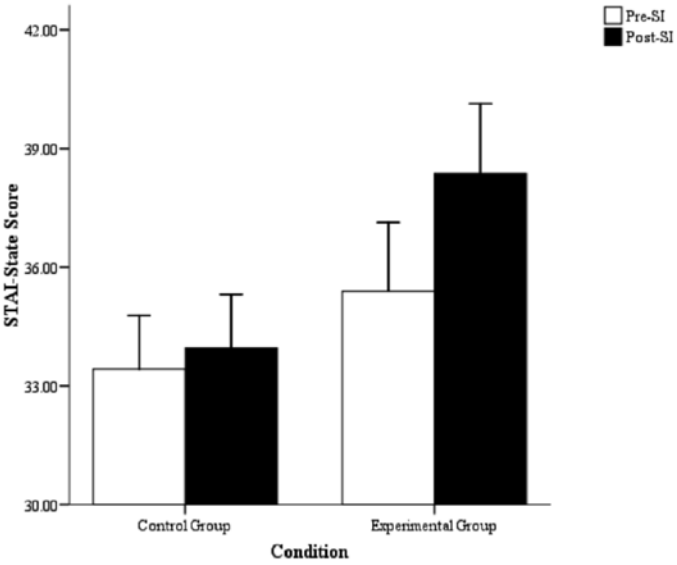

Figure 2 Mean STAI State scores before and after the manipulation procedure, shown separately for participants assigned to the control- and experimental group

Depression (before the manipulation procedure) was entered as a covariate in order to examine the unique effect of stress on implicit self-esteem.[9] The results revealed no significant main effects of *Time*, $F(1, 90) = .09$, $p = .76$, partial $\eta^2 = .001$ and *Group*, $F(1, 90) = 1.37$, $p = .25$, partial $\eta^2 = .015$, but the *Time* x *Group* interaction was significant, $F(1, 90) = 4.33$, $p < .05$, partial $\eta^2 = .05$. Post-hoc paired samples *t-tests* showed a significant decrease in implicit self-esteem after the manipulation procedure compared to before the manipulation in the stress-induction group, $t(44) = 2.07$, $p < .05$, whereas the findings indicated no significant change in implicit self-esteem among participants in the control group, $t(47) = –1.21$, $p = .23$. These results indicate that stress-induction decreases implicit self-esteem (see Figure 3).

Implicit depression

Similar Group x Time ANOVAs were conducted to examine the effect of stress-induction on implicit depression (*D*-score) while controlling for implicit self-esteem (NLT score before the manipulation procedure). We entered implicit self-esteem as covariate in order to examine the unique effect of stress on implicit depression.

9 Changes in implicit self-esteem and implicit depression as a result of stress were similar when we did not enter the covariate.

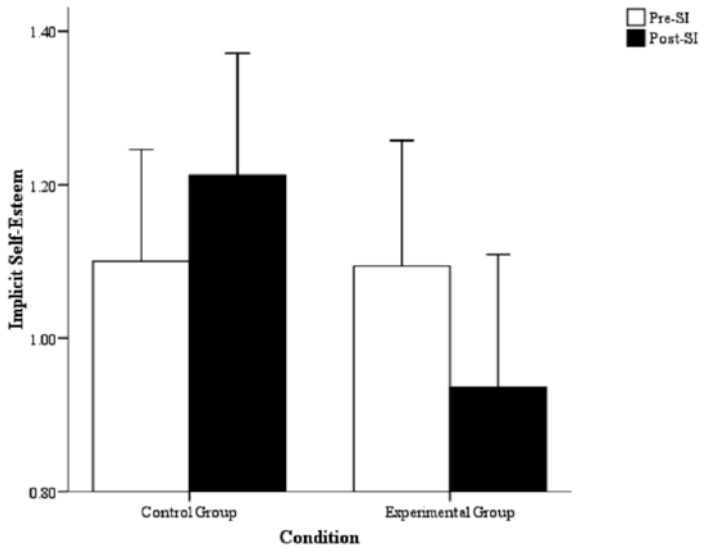

Figure 3 Mean NLT scores before and after the manipulation procedure, shown separately for participants assigned to the control- and experimental group

The results showed no significant main effects of *Time*, $F(1, 91) = 1.86$, $p = .18$, partial $\eta^2 = .020$ *and Group*, $F(1, 91) = .14$, $p = .71$, partial $\eta^2 = .002$, *but a significant Time* x *Group* interaction, $F(1, 91) = 8.21$, $p < .01$, partial $\eta^2 = .08$. Post-hoc independent samples *t-test* showed no significant group differences at post-test, $t(92) = -1.24$, $p = .22$. Again, paired samples t-tests were performed to examine the interaction for the stress induction and control group separately. Participants in the stress induction group showed significantly lower *D* scores (indicating lower positive bias, thus higher levels of implicit depression) after the experimental manipulation compared to before the manipulation, $t(45) = -3.06$, $p < .01$, whereas in the control group, no significant differences were observed, $t(47) = -1.02$, $p = .31$. These results indicate that stress induction increases implicit depression (i.e., lower positive bias).

Effect of Stress Induction on Explicit Measures

Explicit self esteem

To examine the effect of stress-induction on explicit self-esteem, similar *Group* × *Time* ANOVAs were performed. A significant main effect of *Time* emerged, $F(1, 88) =$

6.08, $p < .05$, partial $\eta^2 = .065$. Participants reported significantly higher explicit self-esteem scores after the experimental procedure than before the procedure. The main effect of *Group*, $F(1, 88) = .09$, $p = .77$, partial $\eta^2 = .001$ and the *Group* x *Time* interaction, $F(1, 88) = .15$, $p = .70$, partial $\eta^2 = .002$ were non-significant. This indicates that explicit self-esteem showed change over time but no differential change in explicit self-esteem between the stress induction and control group.

Explicit depressive symptoms

A significant main effect of *Time* emerged, $F(1, 86) = 7.17$, $p < .01$, partial $\eta^2 = .077$, indicating that participants reported significantly higher CES-D scores after the experimental procedure compared to before the procedure. The main effect of *Group*, $F(1, 86) = .73$, $p = .40$, partial $\eta^2 = .008$ and the *Group x Time* interaction, $F(1, 86) = .58$, $p = .45$, partial $\eta^2 = .007$ were not significant. Thus, depressive symptoms changed over time, but this change did not differ between the stress induction and control group.

Discussion

According to cognitive theories, the activation of dysfunctional attitudes existing in memory may lead to psychological problems (e.g., depression). Dual process models suggest that associative and reflective cognitive processes differ in their effect on the development of psychopathology and reactions to stressful life events. Therefore, the main purpose of the present study was to gain more insight into the effects of stress on implicit and explicit measures of self-esteem and depression. We hypothesized that all of these measures would show immediate changes in response to acute stress. The findings revealed that acute stress indeed leads to increases in implicit depression and decreases in implicit self-esteem, whereas stress did not have a significant effect on explicit measures of self-esteem and depression. These results offer new insights into the relationship of stress with implicit and explicit attitudes and provide experimental support for dual process models.

First, we found that implicit attitudes showed immediate change following the stressor, whereas explicit attitudes were not affected by stress. More specifically, the stress-induction appeared to increase implicit depression and decrease implicit self-esteem, whereas stress did not have a significant effect on either explicit self-esteem or depression. These findings are in line with the findings of Haeffel and colleagues (2007) and show that acute stress activates implicit attitudes, indicating that individuals tend to evaluate the self negatively and associate the self with sadness. Surprisingly, the results showed that participants in both the

stress-induction and control group reported higher levels of explicit self-esteem and depressive symptoms after the experimental procedure. Because self-esteem and depressive symptom are negatively related, this is an unexpected finding, which is contrary to any expectation and the cognitive theory (Beck et al., 1979). Therefore, this result must be interpreted with caution.

Dual processing models (e.g., Beevers, 2005; Gawronski & Bodenhausen, 2006) provide a useful framework to explain the differential effects of acute stress on implicit and explicit attitudes. Beevers (2005) suggested that when individuals reach a certain negative mood state, they experience a shift towards reflective processes (i.e., explicit attitudes) that corrects the activated negative associative bias (e.g. negative implicit self-esteem) to prevent depressive symptoms. Similarly, Haeffel et al. (2007) argued that in response to a stressful event, explicit attitudes might develop from the reflective processes (deliberative, conscious, effortful) to represent the outcome of the final cognitive interpretation, whereas implicit attitudes represent the automatic response stemming from associative processes. Thus, explicit cognitive processes may override the activated negative implicit attitudes and thus reinterpret the negative event. In light of the IR- model, Cunningham and Zelazo (2007) stated that with the passage of time, processing continues to be refined through additional interactions between the associative and reflective processing mode in order to obtain a more detailed identification of the situation (stimulus). According to Haeffel et al. (2007), specifically these explicit attitudes (final interpretation) are important in predicting long-term depressive symptoms. Indeed, in the domain of addictive behaviours, many studies have shown that individual differences in the strength of executive control processes (e.g., working memory) moderate the effect of implicit cognitive processes on behaviour (see reviews by Stacy & Wiers, 2010; Wiers, Houben, Roefs, Hofmann & Stacy, 2010). A similar moderation appears to play a role in internalizing problems (Salemink & Wiers, 2012).

Importantly, in the present study, implicit measures were consistently assessed prior to the explicit measures, because preceding implicit measures with explicit ones might bring implicit tasks under greater conscious control (Bosson et al., 2000). However, as a result, the finding that implicit but *not* explicit attitudes changed due to acute stress may have been influenced by the fixed order of assessment, with implicit measures being assessed before explicit measures. The level of stress that participants experienced due to the stress induction may have already subsided over time and thus did not affect the explicit measures. In addition, it is possible that participants remembered their responses prior to the stress-induction procedure on the explicit measures and simply reproduced them because only a short time had passed. The finding that explicit measures did not show reactivity to the stress induction was unexpected and contrary to previous

studies (Bosch et al., 2009; Gruenewald et al., 2004). Therefore, the finding that stress did not affect explicit measures must be interpreted with caution and need to be addressed in future research.

The present study had a number of limitations. First, our sample comprised only healthy students, and future research should reveal whether our findings could be generalized to other groups. Second, to assess implicit self-esteem, we only administered the NLT. To replicate the current findings, it might be interesting to assess different implicit measures (e.g., IAT, Greenwald et al., 1998). Despite these limitations, our study provides new insights into the effect of acute stress on implicit attitudes. More specifically, this is the first study to suggest that stress increases implicit depression and decreases implicit self-esteem.

The present study provides new avenues for the clinical practice and future research. To completely understand the role of cognitive processes in the development of psychopathology, it might be important to further identify mechanisms (e.g., ego threats, social exclusion) of change that lead to asymmetric changes between implicit and explicit attitudes and therefore cognitive vulnerability (i.e., fragile or damaged self-esteem; Bosson, Brown, Zeigler-Hill, & Swann, 2003; Creemers, Scholte, Engels, Prinstein, & Wiers, 2012). Next, direct manipulations of implicit self-esteem (and maybe implicit depression associations) can be tested (cf. Baccus et al., 2004; See, MacLeod, & Bridle, 2009). In addition, it would be interesting to test the effects on implicit and explicit self-esteem, and their discrepancy, of CBT interventions aimed at increasing self-esteem.

Appendix: Stimuli for Depression IAT

I, Me, Self, Myself, My, Mine, They, Other, Them, Their, His, Her, Depressed, Helpless, Hopeless, Sad, Crying, Happy, Cheerful, Joyful, Delighted, Smiling.

Chapter 5

Randomized Controlled Trial Testing the Effectiveness of a Depression Prevention Program ('Op Volle Kracht') Among Adolescent Girls with Elevated Depressive Symptoms

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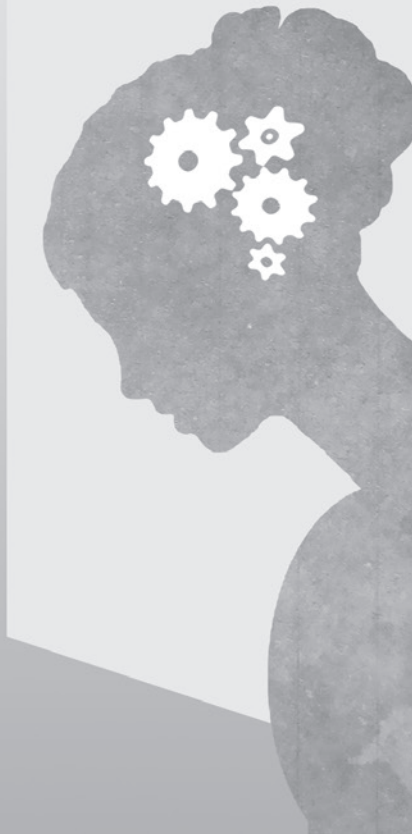

Abstract

Depression rates rise dramatically from the early to late adolescence. Especially young adolescent girls with elevated depressive symptoms are at high risk for developing a depression during adolescence or adulthood. Therefore, the prevention of depression is important especially in this high-risk group. The aim of the present study was to examine the effectiveness of the Cognitive Behavioral Therapy (CBT) component of the depression prevention program 'Op Volle Kracht' (OVK) among Dutch adolescent girls with elevated depressive symptoms. In total, 102 adolescent girls (11-15 years) in the first and second year of secondary school participated in this study. The girls in the experimental group (n = 50) followed the eight CBT-lessons of OVK and reported depressive symptoms one week prior to the start of the lessons, after every lesson, at one-month and 6-months follow-up. The girls in the control group (n = 52) exclusively reported depressive symptoms at the same time points. Latent Growth Curve Modeling showed that the decrease in depressive symptoms was significantly larger for girls in the experimental group compared to the girls in the control group. Furthermore, it was found that at 6-months follow-up, the girls in the experimental group had significantly lower levels of depressive symptoms compared to the girls in the control group. These findings indicate that the CBT-component of OVK effectively reduces depressive symptoms in short term and possibly prevents the development of a clinical depression.

Introduction

Depression is one of the most prevalent causes of emotional stress (Murray & Lopez, 1997) and disease burden (Caspi et al., 2003). It involves disturbances of emotion, such as experiencing feelings of sadness and loss of interest or pleasure in most activities, which affect an individual's entire emotional life (Cicchetti & Toth, 1998). Adolescence is a key period with respect to clinical depression, as depression rates rise dramatically from the early to late adolescent years (Chaplin et al., 2006; Lewinsohn, Rohde, & Seeley, 1998). Especially adolescent females are vulnerable to develop a clinical depression (Nolen-Hoeksema & Girgus, 1994). Females show more subclinical or elevated levels of depressive symptoms in early adolescence compared to males, which is associated with greater impairment in daily life and an increased risk for developing a clinical depression (Hankin & Abramson, 2001; Gotlib, Lewinsohn, & Seeley, 1995). In turn, clinical depression is associated with serious consequences, such as drug abuse, social rejection and isolation, academic difficulties and suicide (Chaplin et al., 2006; Gillham & Reivich, 2004). Given the high prevalence of elevated depressive symptoms in early adolescence and the heightened vulnerability among females, girls in early adolescence form a high-risk group for which prevention of depression is important.

The Penn Resiliency Program (PRP) is a universal depression school-based prevention program developed for 10 to 14 years old children and adolescents (Gillham, Brunwasser, & Freres, 2008). This program includes a Cognitive-Behavioural Therapy (CBT) component and a social problem-solving component, which focus on teaching adolescents skills to improve their resiliency and prevent the development of a depression. In the United States, PRP has not only been offered as a universal depression prevention program, but also as an indicated depression prevention program that focuses on high-risk adolescents who already have elevated depressive symptoms. Both the universal and indicated application of PRP have shown to be effective in reducing depressive symptoms and preventing depression (Brunwasser, Gillham, & Kim, 2009; Gillham et al., 2006).

In the Netherlands, PRP has recently been adapted, resulting in the program 'Op Volle Kracht' ('On Full Power'). Like PRP, 'Op Volle Kracht' (OVK) also has a CBT-component and a social problem-solving component. Currently, the effectiveness of OVK is tested as a universal school-based prevention program in an ongoing study among Dutch adolescents (Tak et al., 2012) and as a selective school-based program in an ongoing study among Dutch adolescents living in high-risk neighborhoods (Kindt, van Zundert, & Engels, 2012). However, OVK has not yet been tested as an indicated prevention program among adolescents who already show symptoms of depression. Therefore, the current study presents a randomized controlled trial evaluating the effect of the CBT-component of OVK

among adolescent girls with elevated depressive symptoms. This study evaluates only the CBT-component of OVK for two reasons. First, our main goal is to examine whether modifying negative thoughts and feelings, which is the aim of the CBT-component, is associated with a decrease in depressive symptoms. Second, Stice, Shaw, Bohon, Marti, and Rohde (2009) showed that shorter program duration might increase the effect of a depression prevention program, suggesting that offering only the CBT-component could contribute to the effect of OVK.

Cognitive vulnerability of adolescents to develop depressive symptoms is related to the internal stress that goes along with the important developmental tasks that have to be fulfilled during the transition from childhood to adulthood, including the development of psychological autonomy, the formation of intimate relationships and the establishment of a cohesive sense of self-identity (Cicchetti & Rogosch, 2002; Cicchetti & Toth, 1996). According to the Cognitive-Behavioural Theory (Beck, 1967b) on which CBT is based, this internal stress is characterized by the presence of maladaptive self-schemas. Beck (1967b; 1976) defined maladaptive self-schemas as negative assumptions about the self, present circumstances, or the future, which are activated by negative events or negative moods that go along with the challenge to fulfil the developmental tasks. If adolescents frequently make negative assumptions about themselves based on of negative events, these assumptions may become automatic thoughts that are activated when experiencing a similar event, which can lead to negative feelings and dysfunctional behaviour (Beck, 1979). Eventually, the maladaptive self-schemas that are triggered by negative life events may lead to an excessive down-regulation of mood and motivation, resulting in elevated depressive symptoms (Steinberg, 2005).

Importantly, these maladaptive self-schemas also offer opportunities for the prevention of depression. Because the cognitive functions of adolescents are not fully developed, the maladaptive self-schemas of adolescents are still malleable (Steinberg, 2005). In this way, the negative assumptions that are associated with the development of depressive symptoms can still be modified into more positive assumptions (Cicchetti & Rogosch, 2002). This means that next to treatment (CBT), the Cognitive-Behavioural Theory may provide a guideline for modifying maladaptive self-schemas in the prevention of depression.

PRP is a prevention program that aims to reduce depressive symptoms in young adolescents by using CBT-techniques (Gillham & Reivich, 2004). In the CBT-component of PRP, CBT-techniques are used to modify the maladaptive self-schemas of adolescents by teaching them to be aware of their negative thoughts, to evaluate these thoughts and eventually to formulate alternative or more positive thoughts (cognitive restructuring; Gillham et al., 2008). PRP has already been evaluated as a universal prevention program in schools, and as an indicated prevention program in primary care clinics and juvenile detention

centers (Brunwasser et al., 2009). Studies investigating the effect of the universal application of PRP showed that both adolescent boys and girls who participated in the program reported lower depression rates immediately after the intervention as well as at 6-8 and at 12 months follow-up compared to adolescent boys and girls receiving no intervention (Brunwasser et al., 2009). The universal application thus has a promising preventive effect on depression among young adolescents. Studies examining the indicated application of PRP also show promising results. Jaycox, Reivich, Gillham, and Seligman (1994) found that the indicated application significantly reduced depressive symptoms in 10-13 year-old school children. Moreover, PRP improved explanatory style for positive events over a 2-year follow-up in adolescents with depressive symptoms in the primary care setting, with girls benefiting more compared to boys (Gillham, Hamilton, Freres, Patton, & Gallop, 2006). Furthermore, PRP significantly prevented co-occurring depression, anxiety, and adjustment disorders among adolescents with elevated depression scores.

Thus, PRP has been shown to reduce depressive symptoms not only as a universal prevention program, but also as an indicated prevention program among high-risk adolescents in the US. It is yet unknown whether these findings can be generalised to a high-risk sample in the Netherlands and whether offering only the CBT-component also leads to a reduction in depressive symptoms. Therefore, the present study examined the effect of the CBT-component of OVK among Dutch adolescent girls with elevated depressive symptoms. Another reason for investigating the effect of OVK in this specific target group is that the effect of PRP in all-girls groups was found to be higher compared to mixed groups (Chaplin et al., 2006). To be able to examine changes in depressive symptoms during the intervention, the levels of depressive symptoms were measured weekly, after every CBT-lesson of OVK (cf. Kazdin, 2009). In the present study, depressive symptoms were measured using two different questionnaires, the Child Depression Inventory (Timbremont & Braet, 2002) was administered every 4 weeks and the CES-D (Hanewald, 1987) every week, to ensure that the effects could not be ascribed to a specific instrument (Kazdin, 2009). Moreover, the two questionnaires made it possible to measure both static (CDI) and more fluctuating (CES-D) depressive symptoms. A decrease in depressive symptoms on both measures is expected in adolescent girls who participated in the CBT-lessons of OVK, compared to the girls who received no intervention.

Methods

Procedure

First, the ethical committee of the research institute approved this study. Second, three secondary schools in the Netherlands were approached to participate in the study. All three schools received letters with information about the study after they agreed to participate. Subsequently, parents of all girls in the first and second year of the participating schools received a letter, in which they were informed about the study and were given the possibility to refuse to provide the permission for their child's participation. All girls who had parental permission were screened for depressive symptoms in class using the Child Depression Inventory (CDI; Timbremont & Braet, 2002). Overall, 800 girls were screened of which 130 girls had elevated depressive symptoms (CDI score $\geq$ 16). Girls who already received mental health care (n = 9) or had a clinical CDI-score and suicidal ideation (CDI score > 19 and score 2 on item 9, n = 3) were excluded from further participation. In the latter case, they were referred to a social worker from mental health care that provided further help when necessary.

Eventually, the remaining 118 girls with elevated depressive symptoms were approached to participate in the actual study. These girls were randomly assigned to the experimental and control group. An independent researcher performed the randomization, which was carried out at a school-level, using a computerized random number generator. Randomization was stratified by the CDI score upon the screening, leading to comparable CDI scores in experimental and control group (t (116) = .19, p = .85). After randomization, 59 girls assigned to the experimental group were approached to participate in the lessons of OVK and were asked to complete the questionnaires. The 59 girls who were assigned to the control group were asked to exclusively complete questionnaires at the same time points as the experimental group. The control group was offered the opportunity to follow the lessons of OVK after the final assessments. In total, 16 girls could not be approached or declined to participate, 52 girls agreed to participate in the control group, and 50 girls agreed to participate in the experimental group. The experimental and control group had comparable scores on depressive symptoms (CDI T0: t (100) = .25, p = .80, see Table 1), with 52.9% having a subclinical CDI score (16-19) and 47.1% having a clinical CDI score (>19) according to the criteria for a normal population in the original CDI manual (Kovacs, 1992). Following the intention-to-treat principle (Gillings & Koch, 1991), the 102 girls that intended to participate at baseline were also included in all statistical analyses. Further information about the participant flow from baseline through follow-up is provided in Fig. 1.

Table 1 Means, Standard Deviations and t-values for the CDI-scores at T0, T4, T8, T12, T16, and at 6-Months Follow-Up for the Experimental Group and Control Group

	OVK	**Control**	
	(*n* = 50)	**(*n* = 52)**	***t*-value** *(df)*
	M (SD)	*M (SD)*	
CDI T0	20.80 (4.01)	21.02 (4.83)	.25 (100)
CDI T4	15.82 (6.62)	19.31 (6.74)	2.62 (98)**
CDI T8	15.02 (8.37)	18.04 (6.47)	1.95 (91)*
CDI T12	13.61 (8.53)	18.24 (7.40)	2.78 (89)**
CDI T16	15.11 (7.76)	17.80 (7.26)	1.75 (94)
CDI 6-months fu	11.70 (8.24)	17.77 (8.17)	3.39 (83)**

Note: * $p \leq 0.05$. ** $p \leq 0.01$. M = Means; SD = Standard Deviations; CDI = CDI-scores; 6-months fu = 6-months follow-up; OVK = experimental group; Control = control group.

The moment of screening with the CDI was defined as time point T0, and the CDI score of the participating girls at T0 was used as a baseline score. Following time points (T4-T12 and T16) were expressed in the number of weeks after the screening. Girls in the experimental group attended the first eight lessons of 'Op Volle Kracht'. Each week, the girls followed one lesson at their own secondary school and after school time. Moreover, they completed an online version of the CDI at home 1 week prior to the start of the first lesson and 4 weeks after the screening (T4), after the fourth lesson (T8), after the last lesson (T12), at a 1-month follow-up (T16), and at a 6-months follow-up. Furthermore, they completed an online version of the Center for Epidemiological Studies Depression Scale (CES-D; Hanewald, 1987) at home 1 week prior to the start of the first lesson (T4), after every lesson (T5-T12), at a 1-month follow-up (T16), and at a 6-months follow-up. The girls in the control group completed the online version of the CDI and the CESD at home at the same time points. Girls who completed at least six assessments (*n* = 98) received a monetary reward for participating in the research project. This procedure was also registered before the start of the study in the Trial Register for RCT's (www.trialregister.nl; Trial ID: NTR3126).

Participants

In total, 102 female adolescents with elevated depressive symptoms participated in the present study. They all were in the first or second year of secondary school, and their age was between 11 and 15 (*M* = 13.30, *SD* = .64). They followed vocational

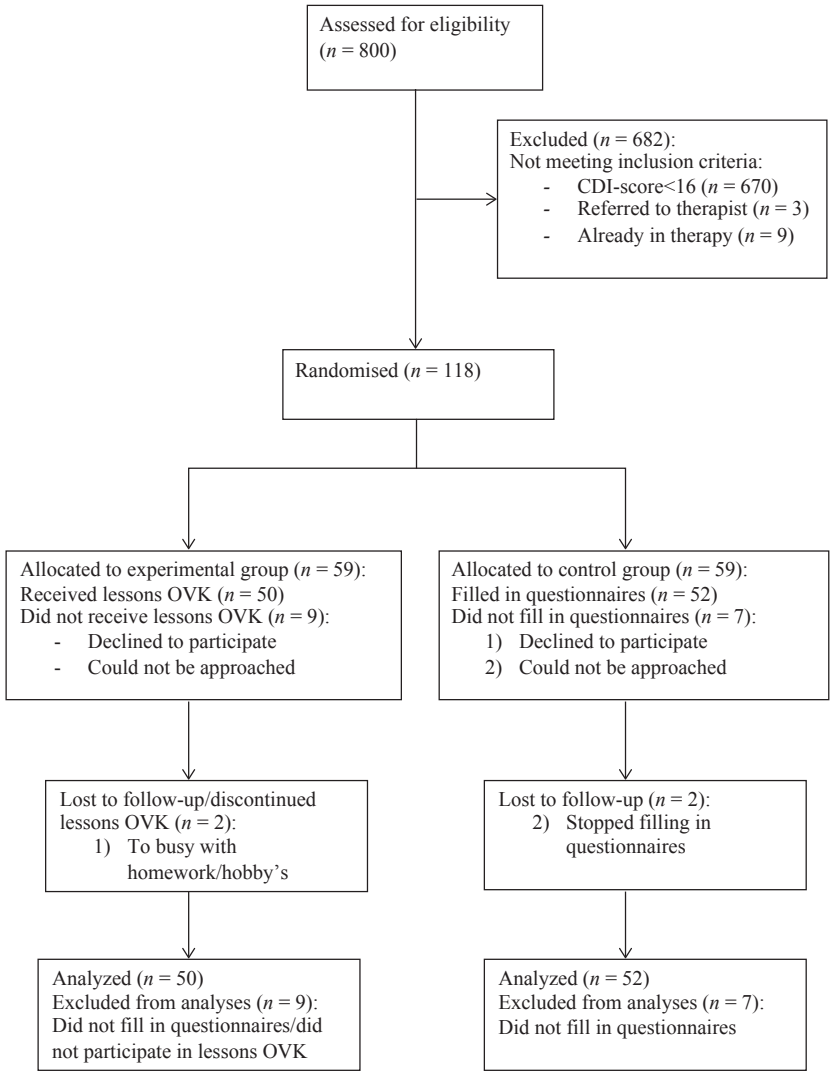

Figure 1 Flow diagram of recruitment, randomization, follow-up, and analyses. CDI = Child Depression Inventory; OVK = Op Volle Kracht

training (12.9%), vocational training/high school training (12.9%), high school training (19.8%), high school training/pre-university training (31.7%), or pre-university training (22.8%). Most of the adolescents were of Dutch origin (98%).

Independent Variable

Op Volle Kracht (OVK)

OVK is an existing depression prevention program, of which all girls in the experimental group divided into four different groups attended the first eight lessons of 50 minutes led by one experienced group therapist. OVK is an adapted version of the US Penn Resiliency Program, and important cultural and content-related modifications have been made to make the program suitable for Dutch teenagers (Tak et al., 2012). A cognitive training based on CBT-principles comprises the first eight lessons of the OVK-program. In this CBT-component, children are taught to change their maladaptive self-schemas into more positive self-schemas (Gillham & Reivich, 2004). A social problem-solving training comprises the last eight lessons of OVK that apply the CBT-principles taught in the first eight lessons to the interpersonal domain (Gillham & Reivich, 2004).

In the first four lessons of the CBT-component, adolescents learn about thoughts and feelings and about the associations among stressful events, negative thoughts, and negative feelings. In the last four lessons, they learn to search for evidence to support or reject the negative thoughts, to formulate more optimistic thoughts, and to test the accuracy of their negative thoughts by formulating the worst, best, and most probable consequence of an event. In this way, they learn to identify and label causal attributions and challenge inaccurate, pessimistic explanations (Gillham & Reivich, 2004). Overall, they thus learn to be conscious of their negative thoughts, to evaluate these thoughts, and eventually to challenge them and formulate thoughts that are more positive. Each lesson includes homework for the next lesson.

Instruments

Depressive symptoms

A Dutch translation of the Child Depression Inventory (Timbremont & Braet, 2002) was used to measure depressive symptoms that are more static. The CDI consists of 27 items measured on a 3-point scale ranging from 0 (*depressive symptom is absent*) to 2 (*depressive symptom is always present*) (e.g., 'I don't feel alone' = 0, 'I often feel alone' = 1, 'I always feel alone' = 2; 'Sometimes I'm sad' = 0, 'I'm often sad' = 1, 'I'm always sad' = 2). The adolescents had to choose the answer that was most in accordance with their own thoughts and feelings. Research on the reliability and validity of the CDI in the Netherlands (Roelofs et al., 2010) showed that alphas ranged between .81 and .86 and that the CDI had a high correlation with DSM-oriented depression scale of the Youth Self Report (r = .71). In this study, Cronbach's alpha ranged from .83 to .90 across assessment waves.

A Dutch translation of the Center for Epidemiological Studies Depression Scale (CES-D) (Hanewald, 1987) was used to measure the more fluctuating depressive symptoms every week. The CES-D consists of 20 items measured on a 4-point scale ranging from 0 (*sporadic/never*) to 3 (*often/always*) (e.g., 'During last week, I felt depressed'; 'During last week, I felt sad'), with higher scores indicating more depressive symptoms. Adolescents had to choose the answer that reflected their thoughts and feelings during the preceding week most accurately. Research on the reliability and validity of the CES-D in the Netherlands (Hanewald, 1987) showed that alphas ranged between .79 and .92 and that the CES-D had high correlations with related questionnaires (e.g., correlation with Beck Depression Inventory: r = .66). In this study, alphas ranged from .89 to .96 across assessment waves.

Statistical analyses

To answer our research question, we first tested changes in depressive symptoms over five time points measured with the CDI at T0, T4, T8, T12 and T16, with T0 as a baseline value. We used t-tests for independent groups to test differences in depressive symptoms between the experimental and control group for each of the five waves. We applied Latent Growth Curve Modeling (LGCM) using the statistical package Mplus version 6.11 (Muthén & Muthén, 1998-2007) to examine the changes in depressive symptoms. To deal with incidental missing values (At T0: 0%, T4: 2%, T8: 9%, T12: 11%, T16: 6%) the Full Information Maximum Likelihood (FIML)-estimator (Enders, 2010, p. 14), which has shown to be a preferred method for handling missing data (Johnson & Young, 2011). The chi-square value and *df*, the Root Mean Square of Approximation (RMSEA; Byrne, 1998), and the Comparative Fit Index (CFI; Bentler, 1990) were used as fit indices. The first step of the analysis examined the growth function (linear, quadratic or cubic) that best reflected changes in depressive symptoms over time. Anticipating the results by looking at the means of the CDI across five time points, we expected that a quadratic growth function would be most adequate for both groups. In this case, the latent growth parameters were the intercept (*i*), the linear component of the growth curve (*s*), and the quadratic component of the growth curve (*q*). A baseline model, an intercept model, a linear model, and a quadratic model were computed and compared to test differences in latent growth parameters between both groups. A significant increase in chi-square when adding new components to the model (intercepts, linear components or quadratic components) indicated that these components differed between the experimental and control group.

Second, we tested changes in depressive symptoms over 10 time points measured with the CES-D at T4-T12 and T16. The CES-D was not measured at T0; thus, CES-D at T4 was used as baseline value. T-tests for independent groups were used to test differences in depressive symptoms for each of the 10 time points. The

Full Information Maximum Likelihood (FIML)-estimator was used to deal with missing values (At T4: 3%, T5: 4%, T6: 6%, T7: 10%, T8: 9%, T9: 10%, T10: 13%, T11: 10%, T12: 12%, T16: 6%) (Johnson & Young, 2011). LGCM was used to determine growth functions for the experimental and control group and to test differences in growth parameters between the two groups in the same way as described above for depressive symptoms measured with the CDI.

Furthermore, we tested the effect of OVK on depressive symptoms measured with the CDI and CES-D at 6-months follow-up. Because the time interval between 1-month and 6-months follow-up was relatively long compared to the intervals between the other time-points (T0-T16), separate analyses were conducted to test the effect of OVK at 6-months follow-up. Again, t-tests for independent groups were used to test differences in depressive symptoms between the experimental and control group. Regression analyses were conducted in M-plus to test whether condition (0=control group and 1=experimental group) predicted depressive symptoms at 6-months follow-up. The baseline values (CDI at T0 and CES-D at T4) were used as controls. To deal with missing values (6-months follow-up: 17.6%), the Full Information Maximum Likelihood (FIML)-estimator was used (Johnson & Young, 2011).

Because OVK was given in four separate groups, we examined whether the analyses had to be controlled for group clustering effects. If the depressive symptoms scores (5 CDI-variables, 10 CES-D-variables) within these subgroups showed significant intraclass correlations (ICC's), the data would have to be corrected for dependency, since in that case, the effect of OVK would have differed across the four subgroups. The ICC's for the 15 variables varied between .01 - .13. Significance of the ICC's were tested with ANOVA's (Snijders & Bosker, 1999) at a significance level of .01 (Bonferroni's correction for chance capitalization with multiple tests is 0.05/15 = .003). The results indicated non-significant ICC's; therefore, correction for dependency was not necessary.

Results

Pre-Intervention Differences

Before conducting the analyses, we tested whether experimental and control group differed in age, education of the child (5 levels), and parents' marital status. The demographic analysis indicated no variability in ethnicity (98% of the girls were of Dutch origin). Furthermore, no significant differences were found between the experimental and control group in age (t (100) = .66, p = .51), education of the child (χ^2 (4) = 2.66, p = .617) and parental marital status (χ^2 (1) = .12, p = .735). Therefore, no covariates were used to control for these background variables.

Descriptive Statistics

Table 1 shows the means, standard deviations, and *t*-values for the CDI scores at T0, T4, T8, T12, T16, and at 6-months follow-up for the experimental and control group. At T4, T8, T12, and at 6-months follow-up, the control group had significantly higher scores on depressive symptoms compared to the experimental group. At T0 and T16, the experimental and control group did not significantly differ in depressive symptoms.

Table 2 shows the means, standard deviations, and *t*-values for the CES-D scores at T4-T12, T16, and at 6-months follow-up for the experimental and control group. At T4, T7, T10-T12, and at 6-months follow-up, the control group had significantly higher scores on depressive symptoms compared to the experimental group. Regarding the other time points, the experimental and control group did not significantly differ on depressive symptoms.

Table 2 Means, Standard Deviations and t-values for CESD-scores at T4-T12, T16, and at 6-Months Follow-Up for the Total Group, the Experimental Group and Control Group

	OVK	**Control**	
	(*n* = 50)	**(*n* = 52)**	***t*-value** *(df)*
	M (SD)	*M (SD)*	
CESD T4	19.53 (9.80)	24.68 (11.07)	2.45 (97)*
CESD T5	16.53 (10.57)	20.71 (11.05)	1.92 (96)
CESD T6	18.65 (11.24)	19.60 (10.71)	.43 (94)
CESD T7	16.43 (9.77)	21.76 (13.02)	2.22 (90)*
CESD T8	18.54 (12.42)	21.11 (11.11)	1.05 (91)
CESD T9	16.80 (12.94)	21.13 (11.17)	1.72 (90)
CESD T10	15.49 (12.08)	20.70 (12.76)	1.97 (87)*
CESD T11	15.53 (11.23)	21.23 (12.25)	2.32 (90)*
CESD T12	14.24 (11.84)	21.96 (14.18)	2.80 (88)**
CESD T16	17.06 (11.26)	21.67 (12.03)	1.94 (94)
CESD 6-months fu	14.45 (12.67)	23.41 (12.55)	3.25 (82)**

Note: * $p < 0.05$. ** $p < 0.01$. M = Means; SD = Standard Deviations; CESD = CESD-scores; 6-months fu = 6-months follow-up; OVK = experimental group; Control = control group.

Latent Growth Curve Modeling Analyzing CDI-Scores at T0, T4, T8, T12, and T16

To test which growth function best reflected the change in depressive symptoms over time, we started to test a linear growth function with intercept and slope as latent variables for both groups separately. The fit of this model was χ^2 (10) = 40.32, p < .001, CFI = .806 and RMSEA = .241 for the control group and χ^2 (10) = 70.67, p < .001, CFI = .644 and RMSEA = .338 for the experimental group. The fit values were unsatisfactory and we introduced a quadratic element in the growth function. The quadratic growth function with intercept (*i*), a linear component of the growth curve (*s*), and a quadratic component of the growth curve (*q*) as latent variables showed a fit of χ^2 (6) = 12.39, p = .054, CFI = .959 and RMSEA = .143 for the control group and χ^2 (6) = 3.80, p = .703, CFI = 1.000 and RMSEA = .000 for the experimental group. The fit was excellent for the experimental group. For the control group the *p*-value was > .05 and the CFI-value > .95, both indicating a good model fit. The RMSEA-value was too high (> .05). However, the RMSEA works well for larger samples (n > 200), but for small samples (in our case n = 52 [control] and n = 50 [experimental]), cutoff points of .05 or .10 for RMSEA are too restrictive (Chen, Curran, Bollen, Kirby, Paxton, 2008) and acceptable models might be over rejected (Herzog & Boomsma, 2009). A cubic model was not tested anymore because then the model would over-fit the data. Therefore, a quadratic growth function was accepted for both groups. The estimates of the parameters were i = 21.130 (p = .001), s = -.444 (p = .018), q = .015 (p = .117) for the control group and i = 20.676 (p < .001), s = -1.237 (p < .001), q = .055 (p < .001) for the experimental group. Although the analysis within the control group revealed a non-significant quadratic component, we compared differences in the quadratic function between the two groups. For the control group, the quadratic function was DEP = 21.130 - .444*T + .015*T², where DEP stands for depression and T for the weeks after baseline (0, 4, 8, 12, and 16). The mean starting level for depression was 21.130, the coefficient -.444 means that the linear component showed a weekly drop in the CDI-score of .444, and the coefficient .015 indicates a weekly increase in the CDI-score for the quadratic component. In fact, the decreasing effect of the linear component was partly suppressed by the increasing effect of the quadratic part. The estimated values of the decrease in depression can be calculated for each time point. The computed values were 1.54 (T0-T4), 1.05 (T4-T8), .88 (T8-T12) and .10 (T12-T16) (see Fig. 2). For the experimental group, the quadratic function was DEP = 20.676 -1.237*T + .055*T². The values of the estimated decrease in depression were 4.07 (T0-T4), 2.31 (T4-T8), .55 (T8-T12) and -1.21 (T12-T16). The highest decrease was from T0 to T4, followed by a slower decrease from T4 to T12. Betweens week 12 and 16, a slight increase of 1.21 was observed.

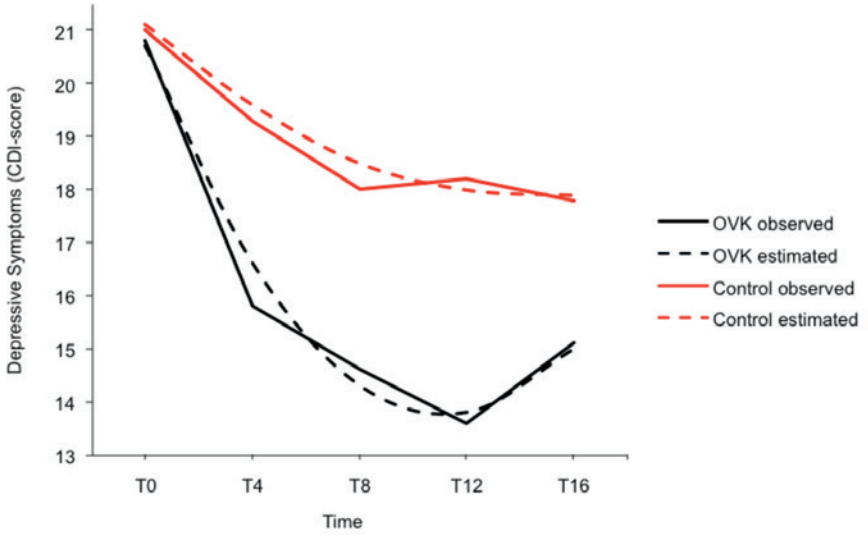

Figure 2 Observed and estimated means for depressive symptoms (CDI-score), illustrating the interaction between time (T0-T16) and condition (OVK/control)

Finally, differences in parameter estimates between the experimental and control group were tested, starting with a baseline growth model for the experimental and control group simultaneously (see Table 3). The baseline model showed a good fit, $p > .05$. The RMSEA-value was high (> .05), but as mentioned previously, this fit measure is less suited for small samples. No significant differences between the groups were found for the intercept ($\Delta\chi^2$ (1) = .274, p = .601) and the quadratic component ($\Delta\chi^2$ (1) = .002, p = .964). The linear component showed a significant difference ($\Delta\chi^2$ (1) = 8.737, p = .003), which means that the linear decrease in depressive symptoms was significantly higher in the experimental group (s = -1.237) compared to the control group (s = -.444).

Table 3 Test Results of Differences in Growth Parameters between Experimental and Control Group (CDI)

	χ^2	*df*	*p*	RMSEA	CFI	$\Delta\chi^2(1)$	*p*
baseline model	16.195	12	.182	.083	.987		
i constrained	16.469	13	.225	.072	.989	.274	.601
i + *s* constrained	25.206	14	.033	.125	.966	8.737	.003
i + *s* + *q* constrained	25.208	15	.047	.116	.969	.002	.964

Note: RMSEA = Root Mean Square of Approximation; CFI = Comparative Fit Index.

Latent Growth Curve Modeling Analyzing CES-D Scores at T4-T12 and T16

A linear growth model showed a fit of χ^2 (50) = 89.34, p = .001, CFI = .899 and RMSEA = .125 for the experimental group and a fit of χ^2 (50) = 163.72, p < .001, CFI = .737 and RMSEA = .209 for the control group. A quadratic model showed a fit of χ^2 (46) = 75.31, p = .004, CFI = .925 and RMSEA = .113 for the experimental group and a fit of χ^2 (46) = 143.95, p < .001, CFI = .773 and RMSEA = .202 for the control group. For both groups, a cubic model could not be identified possibly due to over fitting or too many parameters in relation to the sample sizes (24 parameters with sample sizes of 50 and 52). The fit of a quadratic model was acceptable for the experimental group but not for the control group. Despite this, we decided to accept a quadratic model also for the control group in order to compare it to the experimental group. Second, it is preferable to use equal models for both groups to describe the same phenomenon (depressive symptoms). Because a quadratic model was accepted for the CDI scores, it was also the preferred model for the CES-D scores. Third, we expected a quadratic model if CES-D scores would have been measured at T0, because the CDI-scores showed a quadratic curve due to the high decrease in depressive symptoms from T0-T4. Moreover, adding more terms in the growth model (quadratic, cubic) improves the approximation of the observed curves. However, this is not always visible in the global fit indices CFI and RMSEA. Global fit indices are less suited to provide model fit for growth curves (Wu, West, & Taylor, 2009). Coffman and Millsap (2006) illustrated that poor global fit may still be consistent with a good approximation at the level of individual growth curves. In statistical packages like Mplus, no specific fit measures are available to evaluate a particular chosen growth model. The estimates of the parameters were i = 22.178 (p < .001), s = -.375 (p = .352), q = .028 (p = .352) for the control group and i = 19.255 (p < .001), s = -1.020 (p = .001), q = .068 (p = .002) for the experimental group.

The quadratic function was DEP = 22.178 - .375*T + .028*T² for the control group and DEP = 19.255 - 1.020*T + .068*T² for the experimental group , where again DEP stands for depression and T for the weeks after baseline (4-12 and 16). As can be seen in Fig. 3, depressive symptoms in the experimental group decreased from T4 through T12. After the end of the lessons, depressive symptoms increased again (T16). The control group showed a rather constant level of depressive symptoms after the baseline measurement. No significant differences between the groups were found for the intercept ($\Delta\chi^2$ (1) = 2.139, p = .144), the linear component ($\Delta\chi^2$ (1) = 3.615, p = .057), and the quadratic component ($\Delta\chi^2$ (1) = .636, p = .425) (see Table 4). The linear component reached borderline significance levels (p = .057), indicating that the linear decrease was steeper for the experimental group compared to the control group, as can be seen in Fig. 3.

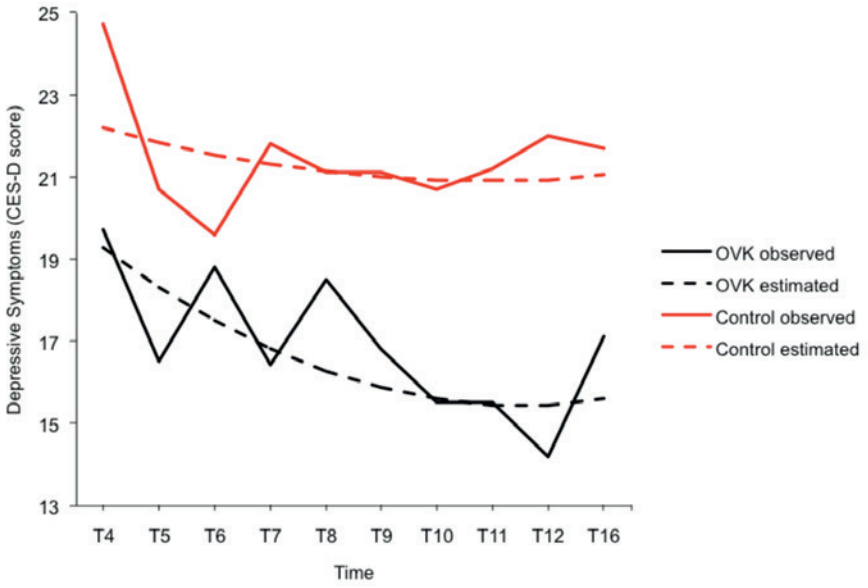

Figure 3 Observed and estimated means for depressive symptoms (CESD-score), illustrating the interaction between time (T4-T16) and condition (OVK/control)

CDI/CES-D Scores at 6-months follow-up

Additional analyses were conducted to analyze the effect of the program on depressive symptoms at 6-months follow-up (measured with the CDI and CES-D). First, we conducted a regression analysis, controlling for participants' CDI-score at

Table 4 Test Results of Differences in Growth Parameters between Experimental and Control Group (CESD)

	χ^2	*df*	*p*	RMSEA	CFI	$\Delta\chi^2(1)$	*p*
baseline model	219.262	92	.000	.165	.845		
i constrained	221.401	93	.000	.165	.844	2.139	.144
i + *s* constrained	225.016	94	.000	.165	.841	3.615	.057
i + *s* + *q* constrained	225.652	95	.000	.164	.841	.636	.425

Note: RMSEA = Root Mean Square of Approximation; CFI = Comparative Fit Index.

T0, to test whether condition (experimental or control group) predicted CDI-score at 6-months follow-up. The results showed a significant effect of condition, β = -.36, $p < .001$. Cohen's d = -.74, with a medium to large effect size. This indicated that the CBT-component of OVK had a significant effect on depressive symptoms of the participating girls at 6-months follow-up.

Second, we conducted a regression analysis, controlling for participants' CES-D score at T4, to test whether condition predicted CES-D score at 6-months follow-up. Again, the results showed a significant effect of condition, β = -.26, $p = .01$. Cohen's d = -.71, with a medium to large effect size. This also indicated that the CBT-component of OVK had a significant effect on depressive symptoms of the participating girls at 6-months follow-up. Overall, these results support the effect of CBT-component of OVK on elevated depressive symptoms.

Discussion

The aim of the present study was to test the effect of the CBT-component of the depression prevention program 'Op Volle Kracht' among Dutch adolescent girls with elevated depressive symptoms. The findings showed that during the intervention, the decrease in depressive symptoms was significantly larger for girls in the experimental group compared to girls in the control group. Moreover, at 6-months follow-up, the girls in the experimental group showed significantly lower levels of depressive symptoms compared to the girls in the control group. This indicated that the CBT-component of OVK is effective in reducing elevated depressive symptoms among young adolescent girls in the short-term.

When examining the findings on the CDI in the experimental group in more detail, it can be seen that the largest decrease in depressive symptoms took place after the screening. Possibly, non-specific factors play an important role in

generating intervention effects (Stice, Rohde, Seeley, & Gau, 2010). For example, girls in the experimental group received extra attention before the start of the lessons (cf. Arrindell, 2001). These girls were told that they would have the opportunity to participate in the OVK lessons, and they were contacted about the content and planning of the lessons. Henderson, Byrne, and Duncan-Jones (1981) showed that this attention by researchers could already have a therapeutic effect. Because girls in the control group also received some attention from the researchers, but to a smaller degree compared to the experimental group, the same mechanism could have triggered the small reduction in depressive symptoms after the screening in this group (Arrindell, 2001). Other non-specific factors that may have caused the large decrease in symptoms in the experimental group before the start of the lessons include the installation of hope and the motivation or willingness to change while the awareness of depressive symptoms after completing the first questionnaire may have caused a decrease in symptoms in both groups (Arrindell, 2001; Stice et al., 2010).

When examining the results of the CES-D in more detail, it can be seen that the (mean) levels of depressive symptoms between T4-T8 (lessons 1-4) were rather unstable in the experimental group. In CBT, this is typical for the beginning of the therapy, when the therapist begins to introduce the client to the cognitive model, teaches him/her basic cognitive techniques, and begins to establish a therapeutic alliance with this client (Tang & DeRubeis, 1999). Relatively few cognitive changes and symptom improvements occur during this stage, but these activities lay the foundation for future improvements. It is possible that this process caused the highly fluctuating levels of depressive symptoms in the beginning of the CBT-lessons in the present study. Between T8 and T10 (lessons 4-5), a profound decrease in depressive symptoms was observed. Tang and DeRubeis (1999) showed that the fourth session often is a critical session in CBT, because the therapeutic events in this session trigger belief changes and schema changes that lead to a sudden large decrease in the level of depressive symptoms around session 5, also called a 'sudden gain'. It is thus possible that the girls who participated in the CBT-lessons of OVK also experienced such a sudden gain around lesson 5. This in turn may have led to a further decrease in depressive symptoms between T10 and T12 (lessons 5-8).

Further, it is notable that the depressive symptoms of the girls in the experimental group increased at 1-month follow-up (T16), after which they decreased again at 6-months follow-up. Gillham et al. (2006) also found a significant effect of PRP at six-months follow-up, but not at post-intervention. They argued that it might take time for participants to learn the PRP-skills and apply them effectively in their day-to-day lives. Participants may increase their use of cognitive-behavioral techniques as they find these skills to be useful, for example in

stressful situations that may occur during the months after the intervention (Gillham et al., 2006). However, this is speculative and should be tested in future studies.

The significant short-term effects of OVK are in line with earlier findings of Gillham et al. (2006) and Jaycox et al. (1994) who showed that the indicated approach of PRP significantly reduced depressive symptoms in US adolescents. However, this is the first study showing the effect of only the CBT-component of the Dutch adapted version of PRP, indicating that besides in combination with the social problem-solving component, this CBT-component can be effective when offered in isolation (see also Stice et al., 2009). In line with the statement of Gillham and Reivich (2004) that CBT could also be used as prevention of depression and the studies that confirmed this statement (e.g., Burton, Stice, Bearman, & Rohde, 2007), the present study thus showed that by offering only the first eight CBT-lessons, OVK can indeed already reduce depressive symptoms and possibly prevent the development of depression. Future research should investigate the extent to which the social problem-solving component adds to the preventive effect of the program and in what way. Moreover, the findings indicate that the program is effective in reducing depressive symptoms as an indicated prevention program not only in the US, but also in the Netherlands.

This study has some limitations. First, the present study was conducted in one Dutch city; thus, the findings cannot be generalized to the Netherlands as a whole. Second, the CES-D was not administered at screening; hence, the randomization was only stratified by the CDI score on the screening (T0). Analyses of the CES-D showed that the experimental and control group differed in the levels of depressive symptoms at baseline (T4). It is possible that this is also a reason why the analyses of the CES-D provided less convincing results compared to the analyses of the CDI, because the largest decrease in depressive symptoms in the experimental group took place after the screening (T0-T4). However, next to the monthly CDI measurement, the analyses of the CES-D provided additional information about the weekly pattern of the depressive symptoms of the participating girls during the program, which could be useful in future studies examining the mechanisms of change during the lessons of OVK (cf. Kazdin & Nock, 2003). Furthermore, child report of depressive symptoms is susceptible to placebo effects. Therefore, clinician ratings, independent evaluator ratings, or parent and teacher ratings of depressive symptoms could be included in future studies on the effects of OVK. Finally, contamination between the experimental and control group could not be completely ruled out in the present study, which might have led to an underestimation of the effect of the OVK-program.

A suggestion for further research is a long-term prospective study investigating the extent to which OVK has an indicated prevention effect on the onset of a

clinical depression among adolescent girls. Moreover, it would be useful to test whether the program is effective among other high-risk adolescents in the Netherlands, such as boys with elevated depressive symptoms and adolescents with depressive parents or parents in marital conflict. Next, it might be of interest to examine the mediating mechanisms of the CBT-component of OVK. To investigate this, not only the levels of depressive symptoms have to be measured during the OVK-lessons, but also the CBT-related cognitive changes, such as belief changes, schema changes, and the use of new cognitive techniques (Tang & DeRubeis, 1999). Moreover, it would be interesting to investigate whether OVK is more effective for youth with certain demographic or clinical characteristics. Finally, 52% of the experimental group and 42.3% of the control group had a clinical CDI-score (> 19) at the time of screening. At six-months follow-up, 12% of the experimental group and 36.5% of the control group had a clinical CDI-score. Therefore, it is possible that some girls developed a clinical depression over time. Because we cannot determine the development of a depression based only on a clinical CDI-score, future studies on OVK should investigate the development of depressive disorders over time.

This study gives rise to some practical implications. When further studies on OVK replicate the positive effect of the CBT-component of OVK on depressive symptoms and when longitudinal research shows that this component is indeed effective in preventing depression among adolescent girls with elevated depressive symptoms, the CBT-component of OVK could be implemented in the curriculum of Dutch secondary schools. Adolescent girls could for example be screened for depressive symptoms during the first year of secondary school, and the CBT-lessons of OVK could then be provided to the adolescents with elevated depressive symptoms in the same way as in the present study.

In sum, it can be concluded that in the present study, the CBT-component of OVK effectively reduced depressive symptoms in the participating girls during the intervention and at 6-months follow-up. This provides preliminary evidence that the CBT-component of a universal depression prevention program effectively prevents the development of a clinical depression among adolescent girls with elevated depressive symptoms, at least in the short run.

Chapter 6

Examining the effect of Cognitive Behaviour Therapy on Implicit and Explicit Self-Esteem Among Adolescent Girls with Depressive Symptoms

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Abstract

Previous studies showed that implicit and explicit self-esteem as well as the discrepancy between both constructs are associated with internalizing problems. A randomized controlled trial was performed in adolescent girls (n = 102; mean age = 13.30) with elevated levels of depressive symptoms in order to examine the effect of Cognitive Behaviour Therapy (CBT) on implicit and explicit self-esteem as well as on their discrepancy. Girls in the experimental group (n = 52) participated in eight CBT sessions, with the measures of the levels of implicit and explicit self-esteem administered repeatedly, while girls in the control group (n = 50) completed only the measures of implicit and explicit self-esteem. Implicit and explicit self-esteem were assessed during the intervention and at one month and six months follow up in both groups. Implicit self-esteem was measured using the Implicit Association Test (IAT) and The Name Letter Task (NLT). Explicit self-esteem was assessed using a State (SSES) and a Trait questionnaire (RSES). At baseline, implicit self-esteem and discrepancy in scores between implicit and explicit self-esteem were not related to explicit self-esteem or the level of depressive symptoms. Explicit self-esteem and depressive symptoms were negatively associated before the intervention. The results showed that CBT did not affect implicit self-esteem or the discrepancy between implicit and explicit self-esteem. In addition, the findings revealed that explicit self-esteem increased significantly in the experimental group when measured with the RSES but not with the SSES but not in the control group. Our findings suggest that CBT changes solely explicit self-attitudes (i.e., explicit self-esteem), which are rational and controllable, stemming from reflective processes. In contrast, CBT did not influence implicit self-attitudes (i.e., implicit self-esteem) that are associative and more difficult to control. Future research should theoretically integrate current findings with existing knowledge on dual process models as well as methodological implications.

Introduction

During adolescence, the prevalence of depressive symptoms rises strongly (Petersen, Kennedy, & Sullivan, 1991). The incidence of a clinical depression disorder during adolescence is between 4% and 8% (Birmaher et al., 1996), and between 17% and 28% report to have had a clinical depression by the end of adolescence (Kessler, Avenevoli, & Merikangas, 2001). Consequently, depression is one of the most prevalent mental disorders during adolescence (Kessler et al., 2001) and a major concern of public health. Previous studies have consistently shown that adolescent girls are at a higher risk to develop a depression compared to boys (Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Nolen-Hoeksema, 1994). In addition to the economic burden for society (Greenberg & Birnbaum, 2005), depressive symptoms during adolescence may have disruptive short- and long-term consequences at an individual level. To illustrate, depressive symptoms during adolescence are related to future depression and anxiety disorders (Fergusson & Woodward, 2002), deprived psychosocial and academic functioning, and substance use (Birmaher et al., 1996). Moreover, depressive symptoms have been found to be an important risk factor for adolescent suicide (Evans, Hawton, & Rodham, 2004). Cognitive models posit that internalizing problems, including depression, result from dysfunctional self-attitudes (i.e., low self-esteem) existing in memory (Clark, Beck, & Alford, 1999; Ellis, 2006). Attitudes can be defined as associations made in memory between a concept (e.g., social object) and an evaluative category (cf. Fazio, Chen, McDonal, & Sherman, 1982). Self- attitudes are assumed to develop based on early life experiences and become stable cognitive structures that shape thoughts, behavior, and emotions of individuals. Recently, a distinction between implicit and explicit self-attitudes has been made, and both have been found to be associated with depressive symptoms (Franck, De Raedt, Dereu, & Van den Abbeele, 2007b; Harter, 1993). In addition, the discrepancy between implicit and explicit self-attitudes has also been found to be an important vulnerability factor for depression (Franck et al., 2007b).

To explain the onset of depressive symptoms, cognitive theories argue that an individual's (maladaptive) attitudes influence information processing by interpreting situations or events in a way that is congruent with their perspective of the world and themselves (Beck, 1967). For example, negative self-attitudes bias information processing, as self-relevant information is processed in a typically negative manner, leading to negative beliefs about 'the self' (Clark et al., 1999). Two information processing modes with distinct operating principles can be distinguished; the associative and the reflective mode (Epstein, 1994; Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004). The associative mode is assumed to be associated with quick information processing, and it operates largely through

automatic processes based on associations in memory. In contrast, the reflective mode is associated with slow, effortful, and rational information processing. Accordingly, a similar distinction can be made between implicit and explicit self-attitudes (i.e., self-esteem). Explicit self-esteem is assumed to have its origins in the reflective mode shaped through rational and conscious processing of self-relevant stimuli, whereas implicit self-esteem reflects a product of the associative mode shaped through automatic, self-evaluative processing of affective experiences (Dijksterhuis, 2006; Epstein & Morling, 1995). Drawing on this, explicit self-esteem is most often assessed by means of questionnaires, whereas implicit self-esteem is usually measured using indirect measures (Greenwald, & Farnham, 2000). Since implicit and explicit self-esteem are assumed to be the outcome of different underlying learning mechanisms, both are at best only weakly correlated (Bosson, Swann & Pennebaker, 2000).

Both implicit and explicit self-esteem have been found to be associated with internalizing problems. Explicit self-esteem has consistently been found to be negatively related to depressive symptoms (Harter, 1993; Vostanis, Feehan, Grattan, & Bickerton, 1996). This is in line with the cognitive theory, which states that negative self-attitudes (i.e., explicit low self-esteem) bias information processing in a negative manner, which in turn increases the risk for developing depressive symptoms (Clark et al., 1999). If negative assumptions towards the self occur frequently, they might become automatic thoughts activated when experiencing a negative event. Subsequently, they might lead to disproportionate down-regulation of mood and motivation characteristic of depression (Beck, 1979; Steinberg, 2005). Studies examining the association between implicit self-esteem and depressive symptoms yielded mixed findings. Higher levels of implicit self-esteem were found to be associated with depressive symptoms (De Raedt, Schacht, Franck, & De Houwer. 2006; Franck et al., 2007b; Gemar, Segal, Sagrati, & Kennedy, 2001), and they predicted depressive symptoms at six months follow up in formerly depressed individuals (Franck, De Raedt, & De Houwer, 2007a). In contrast, Risch et al. (2010) found that lower implicit self-esteem was related to current depression while Bos, Huijding, Muris, Vogel, and Biesheuvel (2010) found no associations between implicit self-esteem and depression. Although the findings of previous studies on implicit self-esteem are mixed, it seems safe to conclude that both implicit and explicit self-attitudes are relevant for understanding the onset, development, and maintenance of depressive symptoms. In addition to the unique associations of implicit and explicit self-esteem with depression, it has been argued that specifically the discrepancy between both concepts predicts the development of depressive symptoms. More specifically, high implicit self-esteem combined with low explicit self-esteem has been found to be related to depressive symptoms and suicidal ideation (Creemers, Scholte, Engels, Prinstein, & Wiers, 2012; Franck

et al., 2007b). It has been argued that depressive symptoms arise because people feel entrapped between their over-learned 'ideal self' (i.e., implicit self-esteem) and their perceived reality (i.e., explicit self-esteem; Franck et al., 2007b).

Based on cognitive models, depressive symptoms are most often treated with Cognitive Behavioural Therapy (CBT), which aims to modify maladaptive self-attitudes in order to reduce depressive symptoms (Beck, Rush, Shaw, & Emery, 1979). Although CBT is a widely used intervention that has proven to be effective in improving explicit self-attitudes (Waite, McManus, & Shafran, 2012), little is known about change in implicit self-attitudes over the course of the treatment or the discrepancy between implicit and explicit self-attitudes. Therefore, in the present study, a randomized controlled trial was performed to examine the effect and the trajectories of change of a successful CBT intervention on implicit and explicit measures of self-esteem in adolescent girls with elevated depressive symptoms. Subsequently, the effect of CBT on the discrepancy between implicit and explicit self-esteem was examined.

In the treatment of depression, (dysfunctional) self-attitudes are believed to be of central importance. CBT aims to identify dysfunctional self-attitudes and replace them by positive attitudes, resulting in healthy thoughts, emotions, and behaviour (Beck et al., 1979). Cognitive models state that a reduction in symptoms is associated with, and might be preceded by, changes in dysfunctional self-attitudes (Beck & Clark, 1997). Although it has been argued that maladaptive self-attitudes (i.e., low self-esteem) could be at the root of depressive symptoms (Taylor, & Montgomery, 2007), studies examining the treatment effects of CBT have focused primarily on explicit self-attitudes (i.e., explicit self-esteem), inquiring about whether implicit self-attitudes (i.e., implicit self-esteem) and the discrepancy between implicit and explicit self-attitudes also matter. Indeed, CBT has been consistently found to be effective in increasing explicit self-esteem in adolescents and adults with depressive symptoms (Butler, Chapman, Forman, & Beck, 2006; Taylor, & Montgomery, 2007; Vostanis et al., 1996), whereas little is known about CBT effects on implicit self-esteem or discrepancy scores. Research on related domains (i.e., anxiety) seems to suggest that CBT reduces implicit panic schemas (Teachman, Marker, & Smith-Janik, 2008), which was an important predictor of change in the severity of panic symptoms during treatment. In accordance with this, Teachmann and Woody (2003) found that implicit phobic schemas were related to phobic avoidance and were significantly reduced during the course of CBT treatment. However, the lack of a comparable control group in both studies made it impossible to draw conclusion about causality between CBT and implicit self-attitudes. In addition, recent evidence has shown that brief CBT interventions changed solely explicit attitudes but did not affect implicit attitudes (Huijding & De Jong, 2009; Wiers, Van den Luitgaarden, Van den Wildenberg, & Smulders,

2005). To date, the effects of CBT on implicit and explicit self-esteem and the discrepancy between both concepts were not examined in adolescents with depressive symptoms.

Therefore, the present study performed a randomized controlled trial in order to examine the effect and the trajectories of change of a successful CBT intervention on implicit and explicit measures of self-esteem -as well as their discrepancy- in adolescent girls with depressive symptoms. Importantly, this CBT intervention has shown to be effective in reducing depressive symptoms at six months follow up (cf. Wijnhoven, Creemers, Vermulst, Engels, & Scholte, 2013). To be able to identify cognitive changes, two measures of implicit self-esteem (IAT and NLT) and explicit self-esteem (RSES and SSES) were repeatedly administered during the course of intervention in both the experimental and control group at similar time points. Two measures of explicit self-esteem were used to capture both more static (RSES) and more fluctuating (SSES) changes during intervention. Additionally, because implicit self-esteem has been argued to be a multi-dimensional construct (Koole, & Pelham, 2003), both measures of implicit self-esteem were used to capture (possibly) distinct aspects of this concept. Through assessing implicit and explicit self-esteem at multiple time points, we were able to examine cognitive changes, which allow us to increase our understanding of the trajectories of change during the intervention (Kazdin, 2007). In line with the existing literature, we hypothesized that the CBT intervention would increase explicit self-esteem. Finally, since the effect of CBT on implicit self-esteem or on the discrepancy between implicit and explicit self-esteem has not been examined previously, and the relation of implicit self-esteem with depressive symptoms showed mixed findings, no hypotheses on these concepts were specified a priori.

Methods

Procedure

Three secondary schools in the Netherlands were approached and informed about the study. After obtaining an agreement to participate from the schools, girls in the first and second year and their parents received a letter with information about the study. Girls and parents were given the possibility to decline participation. Subsequently, girls who wanted to participate and obtained parental permission were asked to complete the Child Depression Inventory (CDI; Timbremont & Braet, 2002) during class. Eventually, 800 girls were screened for depressive symptoms, with 130 girls showing elevated levels of depressive symptoms (CDI score $\geq$ 16). Girls with clinical depressive symptoms *and* suicidal ideation (CDI >19 combined with score 2 on item 9, n = 3), or those already receiving mental health care (n = 9),

were excluded from participation, for whom referral to a social worker from mental health care was obtained.

Next, girls with elevated levels of depressive symptoms who were included in the study (n = 118) were randomly assigned to the experimental and control groups. Randomization was performed at the school level and stratified by the CDI-score administered during the screening. As a result, both the experimental and control group showed comparable levels of depressive symptoms (t = 0.19, p = 0.85). Following the randomization procedure, 59 girls were asked to participate in eight CBT group-sessions and complete questionnaires (experimental group), and 59 girls were approached to complete questionnaires at similar time points (control group). Girls in the control group were given the opportunity to receive similar CBT sessions after completing the data collection. Eventually, 50 girls were assigned to the experimental group, 52 girls were assigned to the control group, and 16 girls declined or could not be reached for further participation. At this time point, the experimental and control group had similar depression scores (CDI T0: t = 0.25, p = 0.80). Furthermore, 52.9% had subclinical levels of depression (CDI score: 16-19) while 47.1% showed a clinical score on depressive symptoms (CDI score >19; Kovacs, 1992). In line with the intention-to-treat principle, all 102 girls who wanted to participate in the study at baseline were included in all statistical analyses (Gillings & Koch, 1991). Figure 1 displays the flow chart of the present study.

The girls who were assigned to the experimental group followed eight CBT group-sessions given weekly at their own secondary school after school time. Baseline scores for the online version of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) were obtained at home one week before the CBT sessions started (T0) and additionally after the fourth session (T1), the last session (T2), at one month (T3), and at six months follow up (T6). The time points were expressed by the number of months from baseline (T0-T6). Furthermore, participating girls completed an online version of the Name Letter Task (NLT; Nuttin, 1985) at home one week prior to the CBT sessions (T0), after every session (T1-T8), at one-month follow-up (T9) and at six-months follow-up (T10). The girls who were assigned to the control group completed the NLT and IAT at similar time points as the girls in the experimental group. A monetary reward was given to girls who completed at least six assessments (n = 98).

Participants

Overall, 102 female adolescents with relatively high levels of depression (CDI-score > 16) participated. The mean score of depression was 20.91 (SD = 4.42) at baseline. All participants were girls in their first or second year of secondary school in vocational training (12.9%), vocational training/high school training (12.9%), high

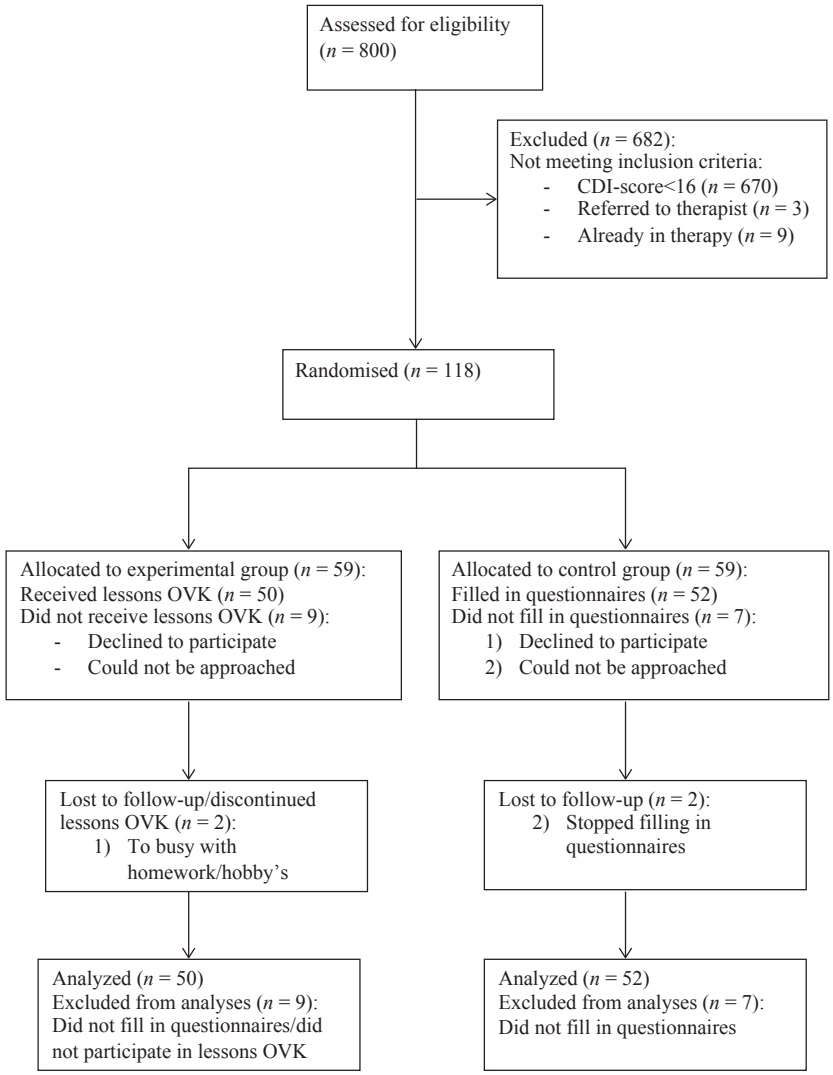


Figure 1 Flow diagram of recruitment, randomization, follow-up, and analyses. CDI = Child Depression Inventory; OVK = Op Volle Kracht

school training (19.8%), high school training/pre-university training (31.7%), or pre-university training (22.8%). Their age ranged from 11 to 15 years of age (M = 13.30, SD = 0.64). Most participants were of Dutch origin (> 95%). The present study did not collect the data regarding social economic status.

Intervention

Op Volle Kracht ('On Full Power')

Op Volle Kracht (OVK) is a depression prevention program, which is an adapted and translated version of the Penn Resiliency Program (PRP; Brunwasser, Gillham, & Kim, 2009). To make the program suitable for Dutch adolescents, relevant cultural and content-related changes have been made (Tak et al., 2012). In total, OVK consists of 16 group-sessions of 50 minutes. The first eight sessions of OVK comprise a cognitive training based on CBT principles, teaching adolescents to modify their dysfunctional schemas into more positive schemas (Gillham & Reivich, 2004). The subsequent eight sessions of OVK include a social problem-solving training through which the CBT-principles are taught to be generalized into the interpersonal domain (Gillham & Reivich, 2004). Girls in the experimental group attended the first eight sessions of OVK that was given by an experienced group therapist in four different groups.

During the first eight sessions of OVK, adolescents learned about the link among stressful events, negative thoughts, negative feelings, and behaviour. They were taught to search for evidence that would support or reject their negative thoughts and learn to formulate more optimistic thoughts. Subsequently, adolescents were stimulated to examine the correctness of their negative thoughts by formulating the worst, best and most probable consequence of an event. As a result, adolescents were assumed to be able to identify causal attributions and challenge inaccurate, pessimistic explanations (Gillham & Reivich, 2004). After each session, participants received homework for the next session.

Instruments

Implicit self-esteem

Implicit Association Test (IAT). The IAT is a double discrimination task used to assess implicit self-attitudes. Using two response keys, participants were instructed to assign a single stimulus displayed in the center of the computer screen to a pair of target categories (i.e., me/not-me) and attribution categories (i.e., valuable/worthless; Greenwald et al., 1998). The IAT tests the relative ease with which a pair of attribution categories combines with a pair of target categories in an association-compatible and an association-incompatible manner. In the present study, the target categories 'me' versus 'not me' were combined with the attribution categories 'valuable' versus 'worthless'. During the compatible blocks, 'valuable' and 'me' share one response key, and 'worthless' and 'not-me', share another response key, while the incompatible blocks consisting of 'valuable' and 'not-me'

shared one response key, and 'worthless' and 'me' shared the other response key. The underlying assumption is that when concepts (e.g., valuable and me) that are more strongly associated in memory compared to other concepts (e.g., valuable and not-me), individuals will show a faster response and make less errors when these concepts share a response key. The difference in reaction times for compatible and incompatible trials can be interpreted as the IAT effect: the relative associative strength between the two pairs of concepts. The IAT holds seven blocks of trials, using similar attribution stimuli as described by Franck et al. (2007b)[10]. To compute the individual IAT-effect of the participants, the improved scoring algorithm (Greenwald, Nosek, & Banaji, 2003) was used (D measures; D2SD), which was recently also validated in a repeated measures context (Glashouwer, Smulders, de Jong, Roefs, & Wiers, 2013). The scoring algorithm controls for responses that are too slow (> 10.000 ms) and/or to fast (300 ms). Within this algorithm, participants with more than 10% of trials with latency less than 300 ms were discarded. Higher scores indicated higher levels of implicit self-esteem. Previous research showed good reliability and validity of the IAT (Nosek, Greenwald, & Banaji, 2005).

Name Letter Task (NLT). During a computerized version of the *Name Letter Task* (NLT; Nuttin, 1985), each letter of the alphabet was randomly displayed only once in the centre of the screen. Participants were asked "How much do you like this letter?", and evaluated each letter on a 7-point scale *(dislike very much - like very much).* There was no response window, but participants were instructed to trust their first intuitive reactions and to work quickly. The initials of an individual's name were assumed to be strongly associated with the self (Nuttin, 1985). Since participants were not aware of the logic that lies behind the task, the evaluation of an individual's own initials can be seen as an index of implicit self-esteem. Previous studies showed satisfactory reliability and validity of the NLT (Bosson, Swann, & Pennebaker, 2000; Koole & Pelham, 2003). To compute the index of implicit self-esteem, the *Baseline-corrected algorithm (B-algorithm)* was used (cf. LeBel & Gawronski, 2009). Finally, higher scores represent higher levels of implicit self-esteem.

Explicit self-esteem

State Self-Esteem Scale. The State Self Esteem Scale (SSES; Heatherton & Polivy, 1991) was used to assess state self-esteem (e.g., 'I feel confident about my abilities'). This instrument consists of 20 items measured on a 5-point scale (*extremely – not at all*) and has three subscales assessing performance-, social-, and appearance self-esteem. In our study, we used the total score as an index of explicit self-esteem. Past

10 Stimuli for IAT
I, Me, Self, Myself, My, Mine, They, Other, Them, Their, His, Her, He, Own, Powerful, Loved, Successful, Handsome, Valuable, Clever, Weak, Failure, Worthless, Loser, Stupid, Bad

research demonstrated good psychometric properties (Heatherton & Polivy, 1991). Alpha's ranged from 0.88 to 0.93 across assessment waves.

Rosenberg self-esteem scale. A Dutch version of the *Rosenberg self-esteem scale* (RSES; Rosenberg, 1965) was used to measure global feelings of self-esteem (e.g., "I feel I do not have much to be proud of"). This instrument consists of 10 items measured on a 4-point scale (totally agree - totally disagree). Past research demonstrated the validity and test-retest reliability of the RSES (Franck, De Raedt, Barbez, & Rosseel, 2008). Alpha's ranged from 0.88 to 0.93 across assessment waves.

Statistical analyses

IAT and RSES, the first measures of implicit self-esteem and explicit self-esteem, respectively, were measured at baseline (T0), one month (T1), two (T2), three (T3), and six months (T6) later. T-tests for independent groups were used to test differences in the means between the experimental and control group for each of the five waves. Latent Growth Curve Modeling (LGCM) with the statistical package Mplus version 6.11 (Muthén & Muthén, 1998-2007) was used to examine changes in self-esteem. To deal with incidental missing values (At T0: 17% and 2% for IAT en RSES respectively, T1: 10% and 9%, T2: 9% and 11%, T3: 22% and 6%, T6: 38% and 18%) the Full Information Maximum Likelihood (FIML) estimator was used (Enders, 2010, p. 14), which has been shown to be a preferred method for handling missing data (Johnson & Young, 2011). The non-response rates for the IAT at T0 can mainly be explained by problems with running the IAT on their home computers. Higher non-response rates at T3 and T6 can be explained by discarded participants because of criteria in the IAT scoring algorithm, possibly due to increased resistance to the task. The chi-square value and df, the Root Mean Square of Approximation (RMSEA; Byrne, 1998) and the Comparative Fit Index (CFI; Bentler, 1990) were used as fit measures. The first step was to test which growth function (linear, quadratic) optimally fits changes in implicit and explicit self-esteem over time. For a linear function, the intercept (*i*) and the slope (*s*) are the two latent growth parameters. For a quadratic function, the latent growth parameters are the intercept (*i*), the linear component of the growth curve (*s*), and the quadratic component of the growth curve (*q*). Differences in growth parameters between experimental and control group were tested with multiple group analyses, starting with a baseline model for the two groups simultaneously and no equality restrictions on the parameters. The fit of this baseline model was expressed in a chi-square value with *df*. In the next model, intercepts were constrained to be equal for the two groups. The fit of this constrained model (in terms of chi-square and *df*) was compared with the fit of the baseline model. A significant increase in chi-square is an indication that the two latent intercepts are different. In the third model, both intercepts and the slopes (for a linear model) or the linear components (for a

quadratic model) were constrained to be equal and the chi-square of this model was compared with the chi-square of the second model. A significant difference is an indication that the slopes or linear components are different. In the fourth model (in case of a quadratic function), intercept, linear component, and quadratic component were constrained to be equal and the fit of this model was compared with the fit of the third model. A significant chi-square difference is an indication that the quadratic components are different.

Second, changes in implicit self-esteem and explicit measured were examined using the NLT and SSES. Both measures were measured at T0, subsequent at eight weeks T1-T8 (a period of two months), three months (T9), and six months (T10). T-tests for independent groups was used to test differences in means between experimental and control group for each of the eleven time-points and LGCM was used to test change over time. For incidental missing values (At T0: 2% and 2% for NLT and RSES, respectively, T1: 2% and 4%, T2: 5% and 6%, T3: 9% and 9%, T4: 9% and 9%, T5: 9% and 10%, T6: 9% and 13%, T7: 9% and 9%, T8: 10% and 12%, T9: 6% and 6%, T10: 17% and 18%), the FIML-estimator was used. To determine growth functions for the experimental and control group and to test differences in growth parameters between the two groups, we applied the same procedure, as described above for the IAT and RSES. The time points were rescaled to months to be comparable with the time points of IAT and RSES. This means that T1-T8 were 0.25, 0.50, 0.75, 1, 1.25, 1.50, 1.75 and 2 months, T9 is 3 months, and T10 is 6 months after T0.

Third, changes in absolute differences between the standardized scores of IAT and RSES (DIFF1) and between the standardized scores of the NLT and SSES (DIFF2) were examined using t-tests for independent groups to test differences in means between the experimental and control group with respect to DIFF1 and DIFF2. LGCM were used to determine the growth functions and multiple group analyses were used to test differences in growth parameters between the two groups in the same manner as described above for IAT and RSES. The incidence of missing values for DIF1 scores was similar as the non-response rates for the IAT.

Because OVK was given in four separate groups, it was examined whether the analyses had to control for group clustering effects. If the implicit self-esteem scores, explicit self-esteem scores, and the DIFF-scores within these subgroups showed significant intraclass correlations (ICCs), the data would have to be corrected for dependency, since in that case, the effect of OVK would differ across the four subgroups. The ICCs for the 3 (implicit, explicit, diff) x 16 (5 + 11 datapoints) = 48 variables varied from .00 - .17 (Mean = .05, Sd = .04). Significance of each ICC can be tested using ANOVA (Snijders & Bosker, 1999) with the four separate groups as independent variable and each of the 48 variables as the dependent one. We found three significant ICCs with $p < .05$. With 48 tests, it is expected that 2.5 tests

will show an erroneously significant ICC. Using a significance level of .01, no ICC was found to be significant and therefore the correction for dependency was not necessary (if we used Bonferroni's correction for chance capitalization with multiple tests, the significance criterium should be 0.05/48 = 0.001).

Results

Pre-Intervention Differences

No significant differences were found between the experimental and control group on the demographic variables education (t = -0.92, p = 0.36), ethnicity (t = 0.70, p = 0.48), age (t = 0.66, p = 0.51), and parents' marital status (t = 0.54, p = 0.59). Therefore, no covariates were used.

Descriptive Statistics

Table 1 shows the means, standard deviations, and t-values for implicit self-esteem (IAT and NLT) for the total group and for the experimental and control group separately. For each time-point, the experimental group and the control group did not significantly differ on each of the implicit self-esteem measures. Table 2 shows the results for explicit self-esteem (RSES and SSES). Significant differences were found for RSES after six months. The experimental group was significantly higher on RSES. The experimental group was significantly higher on SSES at T0 and T10. Table 3 shows the results for the absolute differences between the standardized IAT and RSES scores (DIFF1-scores) and for absolute differences between the standardized NLT and SSES scores (DIFF2-scores). No significant difference was found at any time point.

Table 4 displays the correlations of both implicit measures across different times of assessment. Significant correlations were found over time for the NLT during the different assessment waves. The IAT scores where at best moderately correlated at different time points, which indicated a moderate test-retest reliability. Furthermore, depressive symptoms and explicit self-esteem were negatively correlated over time while both explicit measures were constantly positively related. At baseline, implicit self-esteem and discrepancy scores between implicit and explicit self-esteem were not related to explicit self-esteem or the level of depressive symptoms (see Appendix).

Latent Growth Curve Modeling

For each of the six variables (IAT, NLT, RSES, SSES, DIFF1 and DIFF2), we tested the growth function that was most suited for change over time in both groups We started to test a linear growth function with intercept and slope for each group

Table 1 Means (M), Standard Deviations (SD) and t-values for implicit self-esteem (IAT and NLT), for the Total Group (Total), the Experimental Group (OVK) and control group (Control)

	Total		OVK		Control			
	Mean	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**	*t*	*p*
IAT T0	.66	(.49)	.69	(.46)	.64	(.52)	.46	*n.s.*
IAT T1 1 month	.48	(.53)	.40	(.51)	.57	(.54)	-1.51	*n.s.*
IAT T2 2 months	.44	(.42)	.37	(.42)	.50	(.41)	-1.37	*n.s.*
IAT T3 3 months	.44	(.44)	.48	(.44)	.42	(.43)	.56	*n.s.*
IAT T6 6 months	.32	(.59)	.25	(.57)	.40	(.61)	-1.02	*n.s.*
NLT T0	.99	(1.27)	1.12	(1.11)	.85	(1.41)	1.08	*n.s.*
NLT T1 1 week	.79	(1.27)	.77	(1.31)	.82	(1.23)	-.20	*n.s.*
NLT T2 2 weeks	.67	(1.22)	.62	(1.20)	.73	(1.26)	-.42	*n.s.*
NLT T3 3 weeks	.64	(1.41)	.64	(1.51)	.65	(1.31)	-.03	*n.s.*
NLT T4 4 weeks	.61	(1.42)	.72	(1.43)	.50	(1.41)	.76	*n.s.*
NLT T5 5 weeks	.58	(1.18)	.48	(1.25)	.67	(1.12)	-.79	*n.s.*
NLT T6 6 weeks	.43	(1.37)	.45	(1.49)	.42	(1.26)	.09	*n.s.*
NLT T7 7 weeks	.48	(1.34)	.38	(1.33)	.58	(1.34)	-.72	*n.s.*
NLT T8 8 weeks	.56	(1.38)	.61	(1.39)	.52	(1.39)	.33	*n.s.*
NLT T9 3 months	.57	(1.36)	.63	(1.31)	.52	(1.42)	.42	*n.s.*
NLT T10 6 months	.44	(1.31)	.45	(1.30)	.43	(1.34)	.06	*n.s.*

Note: n.s. not significant

separately. For RSES, SSES, DIFF1, and DIFF2, the fit of a linear growth model was sufficient for both groups. Introducing a quadratic component for these four variables provided erroneous results (negative variances of parameter estimates) due to over-fitting. For IAT and NLT, the fit of a linear growth model was not adequate for the experimental group and/or the control group. We introduced a quadratic element in the growth function of both groups. A summary of the fit of these models is given in Table 6. The baseline models showed acceptable fit with CFI-values that varied between .868 and 1.000. The RMSEA values are sometimes unsatisfactory. However, RMSEA as fit measure works well for larger samples ($n > 200$), but for small samples (in our case $n = 52$ [control] and $n = 50$ [experimental]), cutoff points of .05 or .10 for RMSEA have been argued to be too restrictive (Chen, Curran, Bollen, Kirby, & Paxton, 2008), resulting in acceptable models to be over rejected (Herzog & Boomsma, 2009). The parameters of the growth functions are

Table 2 Means (M), Standard Deviations (SD) and t-values for explicit self-esteem (RSES and SSES), for the Total Group (Total), the Experimental Group (OVK) and control group (Control)

	Total		OVK		Control			
	Mean	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**	*t*	*p*
RSES T0	25.14	(5.58)	26.08	(6.03)	24.24	(5.01)	1.67	*n.s.*
RSES T1 1 month	26.37	(6.22)	27.28	(6.98)	25.47	(5.29)	1.42	*n.s.*
RSES T2 2 months	26.85	(6.56)	28.37	(6.49)	25.29	(6.33)	2.29	*n.s.*
RSES T3 3 months	26.85	(5.99)	28.02	(6.25)	25.73	(5.56)	1.90	*n.s.*
RSES T6 6 months	26.86	(6.63)	28.93	(7.05)	24.98	(5.67)	2.84	**
SSES T0	59.53	(12.93)	62.27	(13.93)	56.90	(11.41)	2.11	*
SSES T1 1 week	61.55	(12.64)	63.51	(14.24)	59.59	(10.60)	1.54	*n.s.*
SSES T2 2 weeks	61.42	(13.84)	62.52	(16.06)	60.31	(11.26)	.78	*n.s.*
SSES T3 3 weeks	61.98	(13.53)	64.39	(15.14)	59.62	(11.41)	1.72	*n.s.*
SSES T4 4 weeks	60.91	(13.87)	62.46	(16.38)	59.40	(10.83)	1.06	*n.s.*
SSES T5 5 weeks	61.52	(13.37)	63.67	(14.64)	59.47	(11.83)	1.52	*n.s.*
SSES T6 6 weeks	62.44	(13.25)	64.56	(15.20)	60.46	(10.92)	1.47	*n.s.*
SSES T7 7 weeks	63.47	(14.03)	65.93	(15.99)	61.06	(11.47)	1.69	*n.s.*
SSES T8 8 weeks	62.46	(14.76)	65.24	(16.43)	59.67	(12.44)	1.82	*n.s.*
SSES T9 3 months	61.06	(12.50)	62.34	(13.94)	59.84	(10.95)	.98	*n.s.*
SSES T10 6 months	61.17	(14.98)	65.08	(16.41)	57.61	(12.73)	2.34	*

Note: n.s. not significant * $p < .05$, ** $p < .01$

given in Table 5. Some non-significant linear (*s*) and quadratic (*q*) parameters in both groups had to be included in the growth function to achieve acceptable fit. The growth functions were explained for IAT and NLT as examples.

Growth functions of IAT

For IAT, the estimates of the parameters for the experimental group were $i = .663$ ($p < .001$), $s = -.116$ ($p < .05$), $q = .012$ (*n.s*), and for the control group, they were $i = .602$ ($p < .001$), $s = -.096$ ($p < .05$), $q = .005$ (*n.s.*). The quadratic components in both groups were not significant but were included because a linear model showed an unsatisfactory fit for the control group. For the experimental group, the quadratic function was $IAT = .663 - .116^{*}T + .012^{*}T^2$, where IAT stands for implicit self-esteem and T for the months after baseline (0, 1, 2, 3 and 6). The estimated starting level for implicit self-esteem was .663. The coefficient of -.116 means that the linear part

Table 3 Means (M), Standard Deviations (SD) and t-values for absolute differences between standardized IAT and RSES scores (DIFF1-scores) and for absolute differences between standardized NLT and SSES (DIFF2-scores) for the Total Group (Total), the Experimental Group (OVK) and control group (Control)

	Total		OVK		Control			
	Mean	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**	*t*	*p*
DIFF1 T0	1.15	(.85)	1.18	(.89)	1.12	(.81)	.31	*n.s.*
DIFF1 T1 1 month	1.00	(.76)	1.02	(.77)	.98	(.75)	.32	*n.s.*
DIFF1 T2 2 months	1.11	(.76)	1.11	(.78)	1.11	(.75)	-.03	*n.s.*
DIFF1 T3 3 months	1.04	(.96)	1.03	(.99)	1.05	(.94)	-.07	*n.s.*
DIFF1 T6 6 months	1.06	(.84)	.92	(.91)	1.19	(.76)	-1.30	*n.s.*
DIFF2 T0	1.01	(.76)	1.01	(.83)	1.00	(.71)	.04	*n.s.*
DIFF2 T1 1 week	1.12	(.78)	1.26	(.88)	.99	(.65)	.06	*n.s.*
DIFF2 T2 2 weeks	1.09	(.76)	1.11	(.79)	1.07	(.74)	.96	*n.s.*
DIFF2 T3 3 weeks	1.07	(.69)	1.03	(.77)	1.11	(.60)	.04	*n.s.*
DIFF2 T4 4 weeks	1.04	(.77)	1.04	(.81)	1.04	(.74)	.48	*n.s.*
DIFF2 T5 5 weeks	1.06	(.84)	1.16	(.90)	.97	(.76)	.34	*n.s.*
DIFF2 T6 6 weeks	1.06	(.88)	1.12	(.95)	1.00	(.81)	.36	*n.s.*
DIFF2 T7 7 weeks	.99	(.78)	1.01	(.86)	.97	(.71)	.08	*n.s.*
DIFF2 T8 8 weeks	1.01	(.76)	.98	(.80)	1.04	(.74)	.27	*n.s.*
DIFF2 T9 3 months	1.05	(.85)	1.09	(.91)	1.00	(.81)	.34	*n.s.*
DIFF2 T10 6 months	1.07	(.88)	.94	(.83)	1.18	(.91)	.92	*n.s.*

Note: n.s. not significant

showed a monthly drop of -.116 in the IAT-score, and the coefficient .012 means a monthly increase of the IAT-score for the quadratic part. In fact, the decreasing effect of the linear part was partly suppressed by the increasing effect of the quadratic part. The estimated values of the decrease in implicit self-esteem were calculated for each time point and were -.104 (T0-T1), -.080 (T1-T2), -.056 (T2-T3), and -.024 (T3-T6). For the experimental group, the quadratic function was IAT = .602 -.096*T + .005*T^2. The values of the estimated decrease in implicit self-esteem were -.091 (T0-T1), -.081 (T1-T2), -0.071 (T2-T3) and -.153 (T3-T6).

Differences in parameter estimates between the experimental and control group were tested starting with a baseline growth model for the experimental and control group simultaneously (see Table 6). The baseline model showed a good fit,

Table 4 Within Correlations of Both Implicit Measures of Self-Esteem

		2	3	4	5	6	7	8	9	10	11
1	NLT T0	.55 **	.45 **	.46 **	.44 **	.44 **	.33 **	.26 *	.25 *	.31 **	.34 **
2	NLT T1 1 week		.61 **	.67 **	.57 **	.49 **	.49 **	.44 **	.55 **	.60 **	.43 **
3	NLT T2 2 weeks			.66 **	.55 **	.61 **	.55 **	.58 **	.54 **	.53 **	.46 **
4	NLT T3 3 weeks				.67 **	.66 **	.67 **	.60 **	.73 **	.60 **	.69 **
5	NLT T4 4 weeks					.58 **	.62 **	.61 **	.65 **	.62 **	.64 **
6	NLT T5 5 weeks						.68 **	.62 **	.67 **	.68 **	.64 **
7	NLT T6 6 weeks							.75 **	.73 **	.66 **	.70 **
8	NLT T7 7 weeks								.73 **	.65 **	.61 **
9	NLT T8 8 weeks									.75 **	.69 **
10	NLT T9 3 months										.60 **
11	NLT T10 6 months										
		2	3	4	5						
1	IAT T0	.39 **	.27 *	.23	.20						
2	IAT T1 1 month		.39 **	.25 *	.11						
3	IAT T2 2 months			.22	.19						
4	IAT T3 3 months				.40 **						
5	IAT T6 6 months										

Note: * $p < .05$; ** $p < .01$; NLT: Name Letter Task; IAT: Implicit Association Test

Table 5 Growth parameters of the implicit measures, explicit measures and the DIFF-scores

	Experimental (OVK) group			Control group		
	i	*s*	*q*	*i*	*s*	*q*
IAT	.663 ***	-.116 *	.012 *n.s.*	.602 ***	-.096 *	.005 *n.s.*
NLT	1.034 ***	-.184 ***	.014 **	.867 ***	-.080 *n.s.*	.004 *n.s.*
RSES	26.790 ***	.492 ***		25.204 ***	.006 *n.s.*	
SSES	63.127 ***	.388 *n.s.*		60.433 ***	-.414 *n.s.*	
DIFF1	1.151 ***	-.034 *n.s.*		1.025 ***	.023 *n.s.*	
DIFF2	1.109 ***	-.027 *n.s.*		.993 ***	.017 *n.s.*	

Note: n.s. not significant * $p < .05$, ** $p < .01$, *** $p < .001$

$p > .05$, RMSEA = .000, CFI = 1.000. No significant differences between the groups were found for the intercept ($\Delta\chi^2$ (1) = .342, *n.s*), the linear component ($\Delta\chi^2$ (1) = .039, *n.s.*), and the quadratic component ($\Delta\chi^2$ (1) = .1.633, *n.s.*). This indicates that the CBT intervention did not affect implicit self-esteem when measured with the IAT.

Growth functions of NLT

The parameter estimates were $i = 1.034$ ($p < .001$), $s = -.184$ ($p < .001$), $q = .014$ ($p < .01$) for the experimental group and $i = .867$ ($p < .001$), $s = -.080$ (*n.s.*), $q = .004$ (*n.s.)* for the control group see Table 5.

For the experimental group, the quadratic function was NLT = 1.034 - .184*T + .014*T² and for the experimental group, the function was NLT = .867 - .080*T + .004*T², where NLT stands for implicit self-esteem and T for the eleven time point in months (0, 0.25, 0.50 ...., 2, 3, 6). The time points T9 (3 months) and T10 (6 months) in this figure need to be placed more to the right to be in accordance with scale unit of the foregoing nine time points.

No significant differences between the groups were found for the intercept ($\Delta\chi^2$ (1) = 509, *n.s.*), the linear component ($\Delta\chi^2$ (1) = 1.197, *n.s.*), and the quadratic component ($\Delta\chi^2$ (1) = .787, *n.s.*), see Table 6. This indicates that the CBT intervention did not affect implicit self-esteem when measured with the NLT.

Growth functions of RSES, SSES, DIFF1 and DIFF2

The growth parameters of RSES, SSES, DIFF1, and DIFF2 can be found in Table 5. Differences in growth parameters between the experimental and control group for each of these four variables were not significant with two exceptions. The slopes of RSES (.492 and .006) and SSES (.388 and -.414) were significantly different

Table 6 Test Results of Differences in Growth Parameters between Experimental and Control Group for IAT, NLT, RSES, SSES, DIFF1 and DIFF2

	χ^2	*df*	*p*	RMSEA	CFI	$\Delta\chi^2(1)$	*p*
IAT							
baseline model	8.97	12	.706	.000	1.000		
i constrained	9.31	13	.749	.000	1.000	.342	.559
i + *s* constrained	9.35	14	.808	.000	1.000	.039	.843
i + *s* + *q* constrained	10.98	15	.754	.000	1.000	1.633	.201
NLT							
baseline model	171.70	114	.000	.100	.924		
i constrained	172.21	115	.000	.099	.924	.509	.476
i + *s* constrained	173.41	116	.000	.099	.924	1.197	.274
i + *s* + *q* constrained	174.20	117	.001	.098	.924	.787	.375
RSES							
baseline model	40.23	20	.005	.141	.941		
i constrained	42.28	21	.004	.141	.938	2.05	.152
i + *s* constrained	51.95	22	.000	.163	.913	9.67	.002
SSES							
baseline model	224.14	122	.000	.128	.923		
i constrained	225.35	123	.000	.128	.923	1.21	.271
i + *s* constrained	230.95	124	.000	.130	.919	5.60	.018
DIFF1							
baseline model	12.17	20	.910	.000	1.000		
i constrained	12.96	21	.910	.000	1.000	.79	.374
i + *s* constrained	14.03	22	.900	.000	1.000	1.07	.301
DIFF2							
baseline model	182.39	122	.000	.099	.868		
i constrained	183.39	123	.000	.098	.868	1.00	.317
i + *s* constrained	185.10	124	.000	.098	.866	1.71	.191

Note: RMSEA = Root Mean Square of Approximation; CFI = Comparative Fit Index

at $p < .01$ and $p < .05$, respectively. The increase in explicit self-esteem measured with RSES was significantly higher for the experimental group. The slopes of explicit self-esteem measured with SSES did not significantly deviate from zero but differed significantly from each other. Since the slopes of SSES did not

significantly deviate from zero (see Table 5), we concluded that only RSES showed a significant positive effect for the experimental group.

Overall, our findings indicated that CBT positively affected explicit self-esteem, which was strongly associated with depressive symptoms. CBT did not change implicit self-esteem and discrepancy scores between implicit and explicit self-esteem, which were at best moderately associated with depressive symptoms.

Discussion

A randomized controlled trial was performed to examine the effect and the trajectories of change of a successful Cognitive Behavioural Therapy intervention on implicit and explicit measures of self-esteem -as well as their discrepancy- in adolescent girls with depressive symptoms. To examine changes in these constructs, two measures of implicit self-esteem (IAT and NLT) and explicit self-esteem (RSES and SSES) were administered during the treatment, at one month, and at six months follow up in both an experimental and a control group. At baseline, neither implicit self-esteem nor discrepancy scores between implicit and explicit self-esteem related to explicit self-esteem or the level of depressive symptoms. Explicit self-esteem and depressive symptoms were negatively associated prior to the intervention. The results showed that CBT did not affect implicit self-esteem and the discrepancy between implicit and explicit self-esteem over the course of the treatment. In addition, CBT significantly increased explicit self-esteem when measured with the RSES but not with the SSES. These findings seem to indicate that CBT is effective in exclusively changing self-attitudes that are rational and controllable stemming from the reflective mode (cf. Butler et al., 2006; Taylor, & Montgomery, 2007; Vostanis et al., 1996). However, it does not alter self-attitudes that are automatic, originating from the associative information processing mode. The most straightforward explanation for the lack of change in implicit self-attitudes in CBT might be provided by means of current dual process models (e.g., Beevers, 2005; Gawronski, & Bodenhausen, 2006). Dual process models make a distinction between two qualitatively different information processing modes, the associative mode that operates quickly and through automatic processes based on associations in memory and the reflective mode that operates slowly and processes information in an effortful, rational manner. As mentioned above, implicit self-esteem is assumed to reflect a product of the associative mode, whereas explicit self-esteem is supposed to stem from the reflective mode. The present finding that CBT did not alter implicit self-esteem while it affected explicit self-esteem positively seems to provide further support for dual process models, which propose that implicit and explicit self-esteem are derived from two different

cognitive processes. Current dual process models postulate that methods that are appropriate for modifying explicit self-esteem may not be evenly suitable for changing implicit self-esteem and vice versa (Gawronski, & Bodenhausen, 2006; Rydell, & McConnell, 2006). Theorists assume that explicit self-attitudes (i.e., explicit self-esteem) are accessible through introspection and within conscious awareness of individuals, whereas implicit self-attitudes (i.e., implicit self-esteem) are considered to be rooted outside of the awareness since the associative mode operates through automatic processes (Gawronski & Bodenhausen, 2006). Rydell and McConnell (2006) argued that explicit self-attitudes could change quickly through verbal and conscious reasoning, in contrast to implicit self-attitudes. In line with this, CBT is characterized by conscious introspection and the examination of one's own (dysfunctional) thoughts that are accessible through the cognitive information-processing mode. Therefore, CBT might be exclusively appropriate for changing attitudes at an explicit level.

Importantly, the finding that CBT does not affect implicit self-attitudes suggests that CBT is not able to tap into the associative processing mode. This is in line with Grumm, Nestler, and Von Collani (2009) who used dual process models as theoretical framework to examine the conditions under which implicit and/or explicit self-esteem could change. In accordance with dual process model theories, they found that associative learning procedures (i.e., evaluative conditioning)[11] changed implicit but not explicit self-esteem while direct thinking tasks (conscious reasoning) changed explicit but not implicit self-esteem. Considering this explanation derived from dual process models, it seems important to wonder about the clinical relevance of the finding that CBT, which is among the most common treatments for depression, does not seem to reach attitudes that are on an implicit level rooted within the associative mode. Hence, the question is whether CBT is able to change only attitudes that appear on the 'cognitive surface' and are accessible trough conscious introspection but does not change underlying implicit self-attitudes that are assumed to be more primitive stemming from early social interactions with primary care givers (Bosson, Brown, Zeigler-Hill, & Swann, 2003; DeHart, Pelham, & Tennen, 2006; Huijding, & De Jong, 2009; Koole, Dijksterhuis, & van Knippenberg, 2001; Wiers et al., 2005).

Germane to this possible implication, several methodological aspects should be discussed when examining the current findings in more detail. First, the results show that implicit self-esteem, as measured with both the IAT and NLT, tends to decrease over time in the experimental and control group. This finding might be

11 Evaluative conditioning is aimed to influence the structure of associations in memory by pairing an attitude object (i.e., 'I') with a set of positive words (e.g., 'beautiful'). Both the attitude as well as the positive words are subliminally presented on a computer screen.

the result of a training effect that occurs when implicit measures are repeatedly administered to individuals (e.g., IAT; Greenwald, Nosek, & Banaji, 2003; Wiers et al., 2005). The mean scores on both implicit measures approach zero over time, which is indicative of a decreased effect size. As a result, genuine treatment effects on implicit measures could be difficult to quantify in a repeated measures design due to the possibly reduced construct validity. Therefore, future research that examines the effect of CBT on implicit self-esteem using the IAT and NLT could opt to minimize the amount of time points in which implicit self-esteem is assessed. Second, the results showed that explicit self-esteem increased in the experimental group when measured with the RSES but not with the SSES. Since we hypothesized that explicit self-esteem would increase in the experimental group, this finding is (partly) unexpected. However, a straightforward methodological explanation arises when examining the trajectories of change of *depressive symptoms* over time (cf. Wijnhoven et al., 2013). Interestingly, the largest decrease in depressive symptoms in the experimental group took place directly after the screening and randomization but still before the start of the group sessions. Non-specific factors, such as the received attention (cf. Arrindell, 2001) or the installation of hope and the motivation to change (Stice, Rohde, Seeley, & Gau, 2010), which play an important role in treatment effects, explained the pre-intervention reduction in depressive symptoms. Since depressive symptoms and explicit self-esteem are highly correlated (see Appendix)[12], one might expect that explicit self-esteem was also affected due to these non-specific factors. However, because explicit self-esteem was measured for the first time after the screening, thus prior to the group sessions, we were not able to capture the effect of hope and attention on explicit self-esteem. As a result, SSES scores in the experimental group differed significantly from SSES scores in the control group prior to the intervention, and therefore the effect of CBT when measured with the SSES did not reach significance. In line with this methodological explanation, and the fact that CBT did change explicit self-esteem when measured with the RSES, it seems safe to conclude that CBT positively affects explicit self-esteem in adolescent girls with elevated levels of depressive symptoms.

Based on the preliminary conclusion that CBT is merely able to change explicit and not implicit self-attitudes, two *contrasting* clinical implications arise. On the one hand, future studies should examine whether intervention outcomes in depression improve through a combined approach of CBT with associative learning

12 The appendix consists of 2 tables with correlations among all measures before treatment and at six months follow up. The correlations with Depressive Symptoms (CDI; Timbremont, & Breat, 2002) are included in the tables to provide further information about the relationship between the examined concepts and depressive symptoms.

procedures. With regard to the latter, these procedures (e.g., evaluative conditioning) have proven to be appropriate for changing implicit self-esteem (Baccus, Baldwin, & Packer, 2004; Grumm et al., 2009). The findings in current literature seem to advocate for an integrated approach, which modifies implicit self-attitudes. More specifically, in the field of anxiety research, it was found that change in implicit attitudes (phobic and panic) was associated with decreased anxiety symptoms during the treatment through exposure procedures (Teachmann et al., 2003; Teachmann et al., 2008). In addition, implicit but not explicit self-esteem has been found to predict future depressive symptoms in formerly depressed individuals (Franck et al., 2007a); thus, it might therefore be related specifically to the recursive nature of depression (Risch et al., 2010). Therefore, examining the effectiveness of a combined approach in which implicit *and* explicit self-attitudes are changed might possibly increase the efficacy of depression treatment and decrease the chance of the recurrence of depressive symptoms. On the other hand, it might be possible that implicit self-esteem does *not* need to be modified in order to obtain a successful depression CBT intervention. Several studies showed that high implicit self-esteem combined with low explicit self-esteem was an important vulnerability marker for depression in a population sample of young adults (Creemers et al., 2012; De Readt et al., 2006). Because specifically the combination of high implicit and low explicit self-esteem might be indicative of depression, it might be possible that as a result of CBT both implicit and explicit self-esteem become congruent high. In line with this, congruent high self-esteem -thus high implicit *and* high explicit self-esteem- has been found to be associated with indicators of psychological health (Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003; Kernis, Lakey, & Heppner, 2008; Schreiber, Bohn, Aderka, Stangier, & Steil, 2012; Schröder-Abé, Rudolph, & Schütz, 2007; Vater, Schröder-Abé, Schütz, Lammers, & Roepke, 2010). We argue that possible implications of both for clinical practice should be addressed in future research.

Several limitations of the current study should also be noted. First, our sample consisted only of adolescent girls with elevated depressive symptoms. Even though participating girls showed significant symptoms of a depression disorder, they were not diagnosed with a DSM-IV major depression disorder (MDD) by a clinical psychologist. Our findings cannot be generalized to adult, clinical, or male populations. Second, there is an ongoing debate about the validity of implicit measures to assess implicit self-attitudes (Buhrmester, Blanton, & Swann Jr., 2011). In line with the previous studies (Bosson et al., 2000), no correlations were found between the IAT and NLT. Implicit self-esteem has been argued to be a complex multidimensional construct, and different implicit measures may capture distinct aspects of implicit self-esteem (Koole & Pelham, 2003). Therefore, it is desirable to use multiple indirect measures when examining implicit self-attitudes (see also

Vater et al., 2012), as has been done in the present study. Finally, we encountered significant non-response rates on the IAT, possibly due to a buildup of resistance over time during which the IAT was repeatedly administered. Despite these limitations, current findings may contribute to a better understanding of cognitive processes in individuals with depressive symptoms and improve CBT interventions.

Appendix

Table 7 Correlations among Measures of Implicit, Explicit Self-Esteem, Difference Scores and Depressive Symptoms before Treatment for both the experimental and Control Group

	1	2	3	4	5	6	7
1. IAT	-	.09	-.14	-.28	-.04	.10	.05
2. NLT	-.06	-	.18	.25	-.17	.12	-.30*
3. RSES	.08	.14	-	.75**	.07	.16	-.63**
4. SSES	-.03	.11	.82**	-	.02	.22	-.61**
5. Diff1	-.35*	-.19	.20	.25	-	.02	.09
6. Diff2	.06	-.10	.27	.25	.21	-	-.18
7. CDI	-.01	-.01	-.74**	-.80**	-.16	-.20	-

Note: Correlations of the Control Group are displayed above the diagonal; Correlations of the Experimental Group are displayed below the diagonal. * $p < .05$; ** $p < .01$

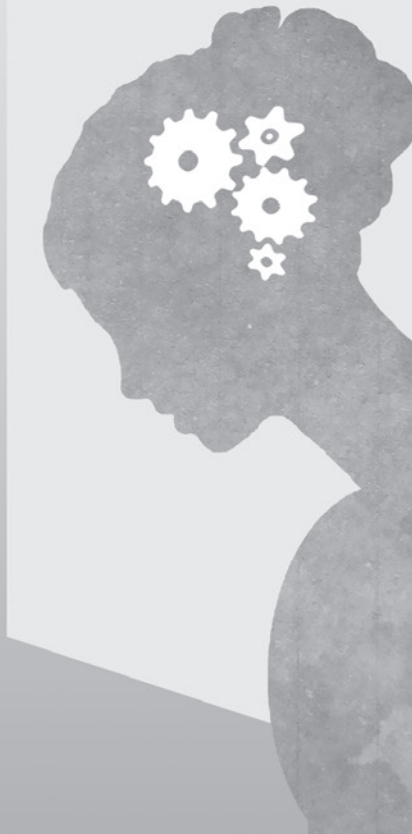
Table 8 Correlations among Measures of Implicit, Explicit Self-Esteem, Difference Scores and Depressive Symptoms at six months follow up for both the Experimental and Control Group

	1	2	3	4	5	6	7
1. IAT	-	.09	-.14	-.14	.12	-.23	.35*
2. NLT	.38*	-	-.17	-.24	-.31	.03	.13
3. RSES	.27	.35*	-	.86**	.04	.03	-.74**
4. SSES	.15	.30	.84**	-	.09	.00	-.72**
5. Diff1	-.42*	-.42*	.17	.21	-	.35*	-.21
6. Diff2	-.38*	.03	.36*	.36*	.51**	-	-.02
7. CDI	-.21	-.29	-.83**	-.78**	-.05	-.23	-

Note: Correlations of the Control Group are displayed above the diagonal; Correlations of the Experimental Group are displayed below the diagonal. * $p < .05$; ** $p < .01$

Chapter 7

General Discussion



The overarching goal of this thesis was to broaden our knowledge on implicit and explicit self-attitudes in relation to internalizing problems in adolescents and young adults. This dissertation examined three main research topics, 1) the relevance of explicit and implicit self-attitudes and their discrepancy in relation to adolescent depression, 2) the effect of acute stress on implicit self-attitudes, and whether this effect was different for explicit self-attitudes, and 3) the effect of the CBT component of 'Op Volle Kracht' on depressive symptoms as well as on implicit and explicit self-attitudes.

In the general discussion, I first review the main findings addressing the three main research topics followed by a discussion on the integration of current findings and recommendations for future research to further improve our knowledge of associative processes in adolescent depression. Finally, limitations of our studies and implications for clinical practice are discussed.

Summary of the Main Findings

Part I: The Relevance of Implicit Self-Esteem, Explicit Self-Esteem, their Interaction and Discrepancy in Relation to Adolescent and Young Adult Depression (Chapters 2-3)

- Explicit self-esteem was negatively related to depressive symptoms, suicidal ideation, and loneliness.
- Implicit self-esteem -as measured with both the IAT and NLT- was not associated with depressive symptoms, suicidal ideation, and loneliness.
- The interaction between implicit (NLT and IAT) and explicit self-esteem was not associated with depressive symptoms and loneliness.
- The interaction between implicit (IAT) and explicit self-esteem was associated with suicidal ideation. Specifically, damaged self-esteem (high implicit combined with low explicit self-esteem) was related to higher levels of suicidal ideation.
- The discrepancy between implicit -as measured with both the IAT and NLT- and explicit self-esteem was associated with depressive symptoms, suicidal ideation, and loneliness. Importantly, the direction of the discrepancy was relevant; specifically, damaged self-esteem was related to all three indices of internalizing problems, while fragile self-esteem was not.

Part II: The Effect of Acute Stress on Implicit and Explicit Self-Attitudes (Chapter 4)

- Acute stress decreased implicit self-esteem and increased implicit depression.
- Acute stress did not affect explicit self-esteem or explicit depression.

Part III: A Randomized Controlled Trial: CBT Effectiveness on Depression and Implicit and Explicit Self-Esteem (and Discrepancy) (Chapters 5-6):

- At six months follow-up, girls in the experimental group (CBT group) showed lower levels of depressive symptoms compared to girls in the control group. That is, the CBT intervention was successful in decreasing depressive symptoms in adolescent girls.
- At six months follow-up, girls in the experimental group (CBT group) showed higher levels of explicit self-esteem (when measured with the RSES) compared to girls in the control group.
- CBT affected neither implicit self-esteem nor the discrepancy between implicit and explicit self-esteem.

Reflections on the Main Findings

The Relevance of Implicit Self-Esteem, Explicit Self-Esteem, their Interaction and Discrepancy in Relation to Adolescent Depression

Chapters 2 and 3 described studies that investigated whether explicit self-esteem, implicit self-esteem, and their interaction were associated with depressive symptoms, suicidal ideation, and loneliness. In addition, the main effects of *size* of the discrepancy between explicit and implicit self-esteem and the *direction* of the discrepancy as well as the interaction between these concepts were examined.

Explicit Self-Esteem

The results showed that explicit self-esteem was negatively associated with depressive symptoms, suicidal ideation, and loneliness. That is, lower levels of explicit self-esteem were related to higher levels of depressive symptoms, suicidal ideation, and loneliness. This is in line with cognitive theories, which propose that dysfunctional self-attitudes characterize internalizing problems (e.g., Clark et al., 1999). Low explicit self-esteem is assumed to be a causal factor influencing the onset and maintenance of internalizing problems (e.g., Beck, 1976; Sowislo & Orth, 2013). Through both inter- and intrapersonal psychological pathways, the vulnerability effect of low self-esteem on depression might become apparent. For example, individuals with low self-esteem seek more reassurance from friends or seek more negative feedback from their partner to confirm their negative self-view (interpersonal pathway). Subsequently, this might lead to social rejection and less social support, leading to depressive symptoms (Giesler, Josephs, & Swann, 1996; Potthof, Holahan, & Joiner, 1995). Additionally, low explicit self-esteem might lead to depression through intrapersonal pathways, as people with low self-esteem are more likely to ruminate, most often about negative self-aspects, which in turn might lead to higher levels of depression (Nolen-Hoeksma, 2000).

The negative associations between explicit self-esteem and depression that were found also correspond with Beevers' (2005) dual process model. In Beevers' model, cognitive vulnerability to depression occurs when negative associative processing remains uncorrected by reflective processes. A negative explicit self-esteem, which is related to internalizing problems, can possibly be seen as the outcome of reflective processing that is not triggered or able to accurately adjust negatively biased associative processing. Individuals vulnerable to depression due to biased associative processing might be subsequently further entangled in a depressive state.

Implicit Self-Esteem

No associations were found among implicit self-esteem, depressive symptoms, suicidal ideation, and loneliness. Implicit self-esteem was assessed with both the NLT and the IAT. As mentioned above, it has been argued that implicit self-esteem is a multi-dimensional construct and that distinct indirect measures tap into different aspects of implicit self-esteem (Koole & Pelham, 2003). Despite the use of both the IAT and NLT, we found no associations with internalizing problems. These findings are consistent with previous studies showing normal (positive) implicit self-esteem in (depressed) individuals (De Raedt et al., 2006; Franck et al., 2007a; Franck et al., 2007b; Franck et al., 2008; Gemar et al., 2001).

Although cognitive theories underline the vital importance of self-attitudes in depression, several explanations are possible to understand the lack of a relationship between implicit self-esteem and internalizing problems. As argued in Chapters 2-3, implicit self-esteem might be less susceptible to temporary stress, particularly in adolescence (e.g., Bos et al., 2010). That is, in contrast to explicit self-esteem that tends to decline (Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002) and depression that tends to increase during adolescence (Costello et al., 2003), it might be possible that implicit self-esteem remains stable. As a result, no associations are present.

This explanation is in line with dual process models, which state that implicit attitudes are based upon repeated experiences for a long period (Smit, & De Coster, 2000). As argued before, explicit self-esteem seems to reflect the outcome of more recent events while implicit self-esteem is thought to be more primitive, and it develops earlier in interaction with primary care givers (e.g., DeHart et al., 2006). Levels of implicit self-esteem were found to be associated with parenting style in that individuals with nurturing parents reported higher implicit self-esteem (DeHart et al., 2006). Negative implicit self-attitudes were found specifically in individuals with a history of emotional maltreatment (Van Harmelen et al., 2010). These findings might indicate that implicit self-esteem is a rather stable construct and that multiple explicit recurrences of negative self-evaluation are required before implicit self-esteem declines permanently. However, it should be noted that the test-retest reliability of implicit measures is still a part of an ongoing debate (e.g., Buhrmester, 2011). Implicit measures can reflect a combination of repeated experience for a long time (trait) and state variables. However, current implicit measures do not allow us to differentiate between trait and state aspect of implicit self-attitudes (cf. limitations).

Implicit - Explicit Discrepancies

Next, our research focused on the associations of implicit - explicit self-esteem discrepancies with internalizing problems. Based on cognitive theories, one might

expect both low implicit and explicit self-esteem to be associated with higher levels of depressive symptoms. However, despite the fact that research in this area is still scarce, it has been argued that specifically the discrepancy between implicit and explicit self-esteem could be relevant for understanding internalizing problems (Franck et al., 2007b). Surprising but consistent, our findings in Chapters 2-3 showed that the *size* of the discrepancy between implicit and explicit self-esteem was related to depressive symptoms, suicidal ideation, and loneliness (the latter only when measured with the IAT). Importantly, the direction of the discrepancy was consistently found to be relevant, as damaged self-esteem (i.e., high implicit combined with low explicit self-esteem) was associated with higher levels of depressive symptoms, suicidal ideation, and loneliness while fragile self-esteem (low implicit combined with high explicit self-esteem) was not. The results were similar irrespective of the indirect measures that were used to assess implicit self-esteem.

Our findings are in line with some studies that found the associations between damaged self-esteem and former depression, current depression, and depression with suicidal ideation (Franck et al., 2007a; Franck et al., 2007b; Franck et al., 2008). Current findings suggest that *high* implicit self-esteem is a vulnerability marker of internalizing problems when explicit self-esteem is low. How can we explain these findings? It might be possible that during adolescence/young adulthood, cognitive vulnerability for depression is characterized by an inner conflict that emerges from an implicit - explicit self-esteem discrepancy. That is, it has been argued that damaged self-esteem in depressed individuals represents a discrepancy between "the ideal self" and "the actual self." Implicit self-esteem, which is proposed to develop earlier in interaction with primary care givers (e.g., DeHart et al., 2006), may be indicative of the 'ideal self'. Subsequently, explicit self-esteem may be indicative of the more recently formed 'actual self'. As a result of the discrepancy, people may feel entrapped between their 'goals' and 'reality', which in turn may lead to internalizing problems (entrapment hypothesis). Since adolescence/young adulthood is characterized by internal and external conflicts and change (e.g., family versus friends; child versus adult; Arnett, 2004), the onset of depression could also be the outcome of an unresolved internal conflict. Although this explanation is speculative and replication is needed, some findings support this hypothesis. For example, particularly individuals with 'fragile' self-esteem (high explicit and low implicit self-esteem) have been found to show smaller actual-ideal self-discrepancies. This might indicate that specifically individuals with damaged self-esteem will display enlarged actual-ideal self-discrepancies. In line with the entrapment hypotheses, individuals with damaged self-esteem are more likely to show maladaptive forms of perfectionism characterized by high fixed goals and standards (Zeigler-Hill & Terry, 2007). In

addition, suicidal people often show high standards or expectations combined with recent failure (Baumeister, 1990), which might be illustrative for damaged self-esteem.

Damaged self-esteem might be the first phase of depression vulnerability from a self-attitude perspective. Possibly, because of damaged self-esteem, individuals are susceptible to the development of multiple depressive episodes, which in the end decrease both implicit and explicit self-esteem (Risch et al., 2010). Eventually, this would be in line with Beevers' dual process model of depression. Importantly, this is purely speculative and future research needs to further examine the causal effect of implicit and explicit self-esteem with depression in terms of 'vulnerability' and 'scars' (see Integration of Findings and Future Directions).

The Effect of Acute Stress on Implicit and Explicit Self-Attitudes

Chapter 4 presented an experiment that aimed to examine the effect of stress on both implicit and explicit self-attitudes. In the absence of previous studies, we sought to find out whether acute stress affects implicit self-attitudes. Cognitive theories posit that depressive symptoms are the result of dysfunctional attitudes, which are assumed to be activated by stressful events (Beck et al., 1979; Clark et al., 1999). Implicit and explicit measures of self-esteem and depression were administered before and after a stress-induction procedure. It was expected that acute stress would affect both implicit and explicit measures of self-esteem and depression. That is, measures of depression were expected to increase while measures of self-esteem were expected to decrease. The results showed that acute stress increased implicit depression and decreased implicit self-esteem. Surprisingly, acute stress did not affect explicit measures of self-esteem and depression. The following paragraph offers a theoretical integration of these findings.

Thus, acute stress affected implicit self-attitudes negatively. How can we understand this change in implicit self-attitudes due to induced stress? In general, individuals are assumed to be strongly motivated to maintain their high self-esteem or increase their low self-esteem (Sedikides, 1993; Sedikides, Gaertner, & Toguchi, 2003). The sociometer theory addresses the evolutionary advantages of high self-esteem, thus the motives for humans to seek self-esteem (Leary, & Baumeister, 2000). The sociometer theory stresses the importance of social inclusion for individuals because of the many adaptive benefits of being part of a group (e.g., sharing knowledge). *The fundamental need for belongingness* suggests that individuals strive to become a part of a group. According to the sociometer theory,

self-esteem can be seen as a sociometer that monitors the extent to which someone is member of the group or part of desired relationships. That is, when individuals perceive their social acceptance (being part of the desired group) as low, they also perceive their self-esteem as low. Subsequently, low self-esteem is assumed to activate behavior in individuals that is aimed to increase social inclusion.

In accordance with the sociometer theory, stressful life events are characterized by social loss, humiliation, or defeat (Brown, 1998; Kendler, Karkowski, & Prescott, 1999; Pine, Cohen, Johnson, & Brook, 2002). That is, stressful situations might threaten the level of belongingness, and they are assumed to potentially demean one's image or social self. Consequently, several psychological and physiological responses can be triggered (Gruenewald et al., 2004). For example, events that are experienced as a threat to the social self (e.g., evaluative situations, such as speech tasks) decrease self-esteem, increase feelings of shame, intensify humiliation, and increase cortisol levels (Dickerson et al., 2004). In line with the sociometer theory, negative implicit self-attitudes are activated due to the acute stress (evaluative speech task) that was induced. In reaction to induced stress, individuals showed negative associative processing (e.g., lowered implicit self-esteem), which is a vulnerability marker of depression according to Beevers' dual process model. However, stress has not been found to affect explicit measures of self-esteem and depression, which was expected.

How can we explain this differential effect of acute stress on implicit and explicit self-attitudes? Interestingly, our findings seem to provide experimental support for the dual process model of Beevers (2005). That is, this model assumes that when negative associative processing occurs (i.e., lowered implicit self-esteem) individuals might experience a shift *from* associative *towards* reflective processing, correcting the activated negative associative bias to prevent depressive symptoms. In response to a stressful event, explicit attitudes can develop from the reflective processes (deliberative, conscious, effortful) to represent the outcome of the final cognitive interpretation, whereas implicit attitudes seem to represent the automatic response stemming from associative processes (Haeffel et al., 2007). Thus, reflective processes may override the activated negative implicit attitudes and thus reinterpret the negative event. Cunningham and Zelazo (2007) stated that with the passage of time, processing continues to be refined through additional interactions between the associative and reflective processing mode in order to obtain a more detailed identification of the situation (stimulus). In line with this, the change in implicit self-attitudes might thus represent the first reaction to the 'social threat', which stems from the fundamental need to belong, making individuals alert and focused on behaviour that will maintain social inclusion. However, during the experiment, it might be possible that the interpretation of the real 'threat' of the situation was over time refined by further

reflective processing, based on which individuals concluded that this situation was not as threatening as first anticipated. Thus, it might be possible that reflective processing calmed participants. In line with this, we assessed the indirect measures prior to the explicit measures because preceding implicit along with explicit measures might bring implicit tasks under greater conscious control (Bosson et al., 2000). As a result, due to reflective processing, the level of stress could subside over time, which may explain the finding that stress did not have an effect on explicit measures.

Importantly, we performed our study in a healthy young adult sample with low baseline levels of depressive symptoms. It is possible that individuals with substantial depressive complaints show different reactions to acute stress. That is, participants in our study showed outcomes of negative associative processing due to stress (e.g., lower implicit self-esteem), but stress did not affect explicit self-esteem possibly due to corrective reflective processing. Perhaps individuals with higher levels of depression show a similar reaction to stress with regard to negative associative processing, but reflective processing is not triggered to adjust the negative associative bias because no expectancies are violated. Consequently, these individuals could get more depressed in response to acute stress. The effect of stress on implicit and explicit self-attitudes and on depression needs to be addressed in future research (see Future Directions).

The Effect of a CBT Intervention on Implicit and Explicit Self-Attitudes

Chapters 5-6 presented a series of studies of a Randomized Controlled Trial we performed. On the one hand, we examined the effect of a CBT intervention ('Op Volle Kracht') on depressive symptoms in an adolescent sample with heightened levels of depression (Chapter 5). On the other hand, we examined the effects of the CBT intervention on implicit self-attitudes, explicit self-attitudes, and their discrepancy scores (Chapter 6).

The Effect of 'Op Volle Kracht' (CBT) on Depressive Symptoms

The main goal in Chapter 5 was to examine the effect of the CBT-component of the depression prevention program 'Op Volle Kracht' on depressive symptoms among Dutch adolescent girls with elevated depressive symptoms. The results showed that depressive symptoms decreased because of the CBT intervention. Furthermore, at six months follow-up, we found that the girls in the experimental group showed significantly lower levels of depressive symptoms in comparison with girls in the control group. Considering that depression is a major burden for society, these

findings may be the first step in decreasing the depression rates in adolescents and young adults. That is, our findings indicated that the CBT-component of OVK is effective in reducing depressive symptoms in short term and possibly also in preventing the development of a clinical depression. Generally, current findings provide further support for an active approach to identify and adequately treat depressive complaints by means of CBT during adolescence (see Future Directions and Clinical Implications).

The effect of 'Op Volle Kracht' (CBT) on Implicit and Explicit Self-Attitudes

The findings presented above show that the CBT intervention was successful in decreasing depressive symptoms in an adolescent female sample with higher levels of depression. Based on the *vulnerability model,* that (negative) self-attitudes are a causal factor in the onset and maintenance of depression (cf, Beck et al., 1967a; Sowislo & Orth, 2013), further investigation of the effect of the CBT component of 'Op Volle Kracht' on self-attitudes is relevant. Therefore, we sought to examine the effect of the CBT-component of 'Op Volle Kracht' on implicit and explicit self-attitudes (and their discrepancy). Implicit self-esteem was measured with both the IAT and NLT, whereas explicit self-esteem was measured with a State (SSES) and a Trait questionnaire (RSES). At baseline, neither implicit self-esteem nor discrepancy scores between implicit and explicit self-esteem (size of the discrepancy) were related to explicit self-esteem or the level of depressive symptoms. Explicit self-esteem was negatively associated with depressive symptoms before the intervention. Our findings showed that CBT did not affect implicit self-esteem or the discrepancy between implicit and explicit self-esteem. Explicit self-esteem increased significantly in the experimental group when measured with the RSES but not with the SSES compared to the control group. In sum, our findings suggest that CBT changed solely explicit self-attitudes (i.e., explicit self-esteem), which are rational and controllable based on reflective processes, whereas it did not influence implicit self-attitudes (i.e. implicit self-esteem) that are associative and more difficult to control.

Our results indicated that CBT enhanced explicit self-esteem by identifying dysfunctional attitudes and replacing them with attitudes that are more positive, resulting in healthier thought emotions and behavior (e.g., Butler et al., 2006). In line with the *vulnerability model,* a reduction in depressive symptoms during treatment was accompanied by changes in explicit negative self-attitudes (Beck, & Clark, 1997). This is an important finding, since theorists assume that negative self-attitudes are at the root of depression (e.g., Taylor, & Montgomery, 2007).

In general, current dual process models can provide the explanation for the lack of change in implicit self-attitudes (e.g., Beevers, 2005; Gawronski, & Bodenhausen, 2006). Methods that are appropriate for changing explicit attitudes

are thus not evenly suitable for changing implicit self-attitudes and vice versa (Gawronski, & Bodenhausen, 2006). Our findings confirm the assumption that explicit self-attitudes are accessible and changeable through conscious introspection (Gawronski, & Bodenhausen, 2006). In contrast, current findings suggest that CBT is not appropriate for reaching and changing implicit self-attitudes in adolescents. Due to the lack of intervention studies related to depression, the field of anxiety treatment offers mixed findings with regard to the malleability of implicit attitudes by CBT (e.g., Huijding, & De Jong, 2007; Reinecke, Soltau, Hoyer, Becker & Rinck, 2012). However, previously, similar results were found, showing that explicit attitudes towards spiders changed, whereas implicit attitudes were not affected by the treatment (Huijding & De Jong, 2009). In line with these findings, explicit self-attitudes, unlike implicit self-attitudes, are assumed to be easily changeable when newly obtained information is inconsistent with the existing assumptions. That is, in our study, the participating girls were characterized according to their self-attitudes through which they evaluated themselves in a negative manner. During the CBT sessions, these girls were asked to search for evidence that supported or rejected their negative thoughts and learn to formulate more optimistic thoughts. Moreover, the girls were motivated to examine the correctness of their negative thoughts, which often resulted in a more positive view of certain assumptions. As a result, participating girls seemed to be able to identify and change their inaccurate negative explicit self-attitudes, according to our findings. Future studies should use mediation analyses to examine whether the change in explicit self-attitudes as a result of CBT precedes the change in depressive symptoms. This hypothesis is in line with the *vulnerability model,* which assumes that explicit self-esteem is a causal factor in the onset and maintenance of depression.

Implicit self-attitudes appeared to be more difficult to change, and they have been found to be based upon repeated experience for a long time (e.g., Smith, & DeCoster, 2000). In line with this, it has been argued that evaluative conditioning or new explicit attitudes that become embedded in the associative mode based on new associations can change implicit attitudes (Gawronski & Bodenhausen, 2006). The associative processing mode is assumed to be the standard mode, and if associations in memory changed with each new experience, associative processing would be less effective, less focused, and much slower (Beevers, 2005). Therefore, Beevers (2005) posited that '*we gain stability by building knowledge slowly in a stepped fashion, so that the associative processing mode attends to similarities that have been observed repeatedly over time*' (p. 977). Therefore, eight sessions of CBT may provide too little opportunity to tap into the associative mode and subsequently affect implicit attitudes. Future research is needed to further understand long-term effects of CBT on implicit self-attitudes (see Future Directions).

Integration of Main Findings and Future Directions

Our findings provide additional knowledge on implicit and explicit self-attitudes in relation to depression, stress, and treatment. That is, we found that in adolescence and young adulthood, specifically damaged self-esteem (higher implicit self-esteem combined with lower explicit self-esteem) was associated with higher levels of internalizing problems. Furthermore, we found that acute stress affected implicit self-attitudes but not explicit self-attitudes, whereas a successful CBT intervention -in contrast- changed explicit but not implicit self-attitudes. In the following paragraph, we theoretically integrate these findings and discuss avenues for future research.

First, the finding that damaged self-esteem increased internalizing problems (Chapters 2-3) while acute stress lowered implicit but not explicit self-esteem (Chapter 4) seemed to be at odds. That is, to explain the association between damaged self-esteem and internalizing problems it was argued that implicit self-esteem represented the self-evaluation that was over-learned for a long period of time and not easy to change. In line with this, it was argued that damaged self-esteem might thus be the first phase in depression vulnerability from a self-attitude perspective. More specifically, possibly because of damaged self-esteem, people become susceptible to (multiple) depressive episodes, which subsequently may lead to both low implicit and explicit self-esteem in the long term (Risch et al., 2010). However, this explanation holds that implicit self-esteem is a rather robust construct that remains stable over time. Our finding that stress lowered implicit self-esteem but not explicit self-esteem seems to be contradictory.

One possible explanation arises when looking *specifically* at the effects of stress on cognitive processes. Cunningham and Zelazo (2007) proposed that (self) evaluation is hierarchically organized and that evaluative processing consists of a continuum ranging from relatively automatic processing to controlled reflective processing. On the one hand, *specifically* stress is assumed to activate automatic associative processing, making it possible to respond to the 'stressor' quickly. On the other hand, stress has been found to limit cognitive resources that are necessary for reflective processing (e.g., Beevers, 2005). In line with this, implicit self-esteem could indeed be a rather stable construct, representing one's initial reactions to self-relevant stimuli. At the same time, *specifically* stress -due to its threatening nature- could (temporary) lower implicit self-esteem, making individuals' alert and respond to the 'stressor' quickly. However, at this point, we do not know whether stress lowered implicit self-esteem temporarily or permanently. In addition, current implicit measures do not allow us to differentiate between trait and state aspects of implicit self-attitudes (cf. limitations). It might be possible that implicit self-esteem reflects a combination of experience that is

being repeated for a long period of time (trait) and state variables that are changeable within a short timeframe. It would be interesting to further examine the interplay between implicit self-esteem and stress in relation to depressive symptoms in a longitudinal design.

Our finding that *specifically* stress -due to its threatening nature- changes implicit self-esteem is in accordance with our explanation of the lack of effect of CBT on implicit self-attitudes (Chapter 6). We argued that due to its verbal, rational, and reflective nature, CBT could perhaps not affect attitudes that are mainly the outcome of associative processing. As a result, explicit self-attitudes based mainly on reflective processing were modified. In the future, it might be interesting to examine the effect of CBT on both implicit and explicit self-attitudes. The first step could be to differentiate the aspects of CBT and its effect on implicit and explicit self-attitudes. For example, perhaps CBT aspects that are more rational, verbal, and reflective are specifically appropriate for changing explicit self-attitudes. One could think of a conscious evaluation of one's relationship with thoughts, emotions, and behavior, examining the correctness of one's thoughts or the replacement of pessimistic for more optimistic explanations (e.g., Gillham & Reivich, 2004). Other aspects of CBT in which an individual is expected to undergo and experience situations that are challenging and perceived as emotionally loaded and more invasive, such as exposure, imaginary exposure, and behavior experiments, might affect implicit self-attitudes. For example, individuals who hold strong beliefs that others perceive them as ugly can be instructed to ask how they look when this thought arises. In line with this, studies examining the effect of CBT in the field of anxiety, finding changes in implicit self-attitudes, (also) used exposure as intervention (e.g., Reinecke et al., 2012). Furthermore, it would be interesting to examine the long-term effects of CBT interventions on implicit self-attitudes. For example, dual process models posit that associative and reflective processes work in concert and that new explicit self-attitudes can become embedded in the associative mode based on new associations. This might indicate that the effect of CBT on explicit self-attitudes that we found will remain constant and eventually form the basis of new automatic associations in memory (i.e., implicit attitudes).

Based on the finding that CBT did not affect implicit self-attitudes, we described two possible directions for future research (see Chapter 6). In short, on the one hand, future studies could examine whether intervention outcomes in depression improve through a combined approach of CBT with associative learning procedures. Associative learning procedures (e.g., evaluative conditioning) are based on classical condition through computerized tasks in which self-relevant stimuli are constantly paired with positive stimuli (e.g., smiling face) in order to change implicit attitudes. Importantly, associative learning procedures (e.g.,

evaluative conditioning) have proven to be appropriate for changing implicit self-esteem (Baccus et al., 2004; Grumm et al., 2009) and possibly providing an opportunity for an integrated approach of CBT and evaluative conditioning aiming to change both implicit and explicit self-attitudes. However, we argue that when examining this integrated approach, it would be fruitful to differentiate between individuals with damaged self-esteem (high implicit and low explicit self-esteem) and congruent low self-esteem (low implicit and explicit self-esteem). As argued before, it might be possible that individuals with multiple episodes of depression are characterized by congruent low self-esteem, whereas individuals experiencing their first episode of depression are more likely to display a damaged self-esteem (e.g., Risch, 2010). Therefore, it would be interesting to first examine the effect of an integrated approach in chronically depressed individuals or individuals who experienced more than three episodes. For example, a Randomized Controlled Trial with two conditions (experimental and control) can be performed in chronically depressed adolescents and young adults. The experimental condition may consist of CBT and evaluative conditioning, whereas the control condition may consist of CBT.

Furthermore, because adolescents/young adults -due to their younger age- are more likely to experience only their first episode of depression, interventions such as CBT that only increase explicit self-attitudes could be sufficient for adolescents. That is, based on our findings (Chapter 2-3) one could speculate that adolescents with depressive complaints are most likely to display the combination of high implicit and low explicit self-esteem (damaged self-esteem). Because CBT appears to increase explicit self-esteem, both implicit and explicit self-esteem might become congruently high. In line with this, congruent high self-esteem -thus high implicit *and* high explicit self-esteem- has been found to be associated with indicators of psychological health (Jordan et al., 2003; Kernis et al., 2008; Schreiber et al., 2012; Schröder-Abé et al. 2007; Vater et al., 2010). Future research is needed to further explore this hypothesis.

In addition to examining the interventions that mainly aim to change implicit *or* explicit self-attitudes, further research into mechanisms that enhance the congruence between implicit and explicit self-esteem seems relevant. For example, a first study by Koole and colleagues (2009) conducted with a small student sample showed that meditation seemed to reduce implicit-explicit discrepancies (i.e., self-esteem). In addition, mindfulness training aims to enhance the clarity of thoughts, feelings, behaviours and sensations of individuals (Brown et al., 2007). An important aspect of mindfulness is to regain control over automatic processes and to become more aware of automatic responses. Possibly, mindfulness decreases implicit-explicit discrepancies because individuals become more aware of their automatic (implicit) responses, re-evaluate them, and finally respond in a more

conscious way. Indeed, Grumm and colleagues (2008) found that the effect of evaluative conditioning could spill over to explicit self-esteem when individuals are instructed to focus consciously on their feelings before reporting their level of explicit self-esteem in a questionnaire. Moreover, mindfulness has been found to reduce levels of depression in healthy (Raes, Griffith, Van der Gucht, & Williams, 2013) and clinical samples (Hofman, Sawyer, Witt, & Oh 2010). Therefore, it might be of interest to examine the effect of mindfulness training on implicit-explicit discrepancies.

Next, another interesting avenue for future research to understand the onset of depression was provided by the combination of findings that on the one hand damaged self-esteem was related to internalizing problems (Chapter 2-3), and on the other hand stress negatively affected implicit self-esteem (Chapter 4). That is, from the perspective of Beevers' (2005) dual process model of depression, it could be argued that individuals with damaged self-esteem (high implicit combined with low explicit self-esteem) who are exposed to stress become vulnerable to depression. Because of the stressor, it could be that (temporarily) both implicit and explicit self-esteem become low. Subsequently, individuals are prone to be entangled in a downward spiral. Specifically, in individuals with damaged self-esteem, this downward spiral might occur because of stress because reflective processes are probably not triggered or lack capacity to adjust the negative associative bias (i.e., lowered implicit self-esteem, cf. Cunningham & Zelazo, 2007). That is, in individuals with damaged self-esteem, a negative associative bias does not violate expectancies because at an explicit level, they will also perceive themselves as negative. Stress is also assumed to limit the cognitive resources necessary for reflective processing, which might lead to an unadjusted negative associative bias (i.e., lowered implicit self-esteem) in response to stress.

This interplay among stress, associative processes, and reflective processes in relation to depression vulnerability needs further research in terms of causality by means of longitudinal studies. In relation to this hypothesis, it could be of interest to further enhance the capacity of reflective processing in individuals in order to increase their cognitive resources to respond to stress adequately. For example, since the impaired functioning of an individual's working memory (e.g., Joormann, Yoon, & Zetsche, 2007; Lissnyder et al., 2011) has been related to depression, future research could examine whether a working memory training could prevent a depressogenic process when negative associative processing occurs. That is, by increasing the capacity of an individual's working memory, it is possible for this individual to respond to stress in a less automatic way and to (re)gain the cognitive resources that are needed to adjust a negative associative bias by means of adequate reflective processing. To illustrate, negative life events and stress are assumed to activate negative (implicit) attitudes in working memory (as found in Chapter 4).

Subsequently, it could be possible that the ability to control the contents of working memory crucial in order to distinguish between individuals who easily recover from activated negative affect, and those who get entangled in a vicious cycle of negative thinking, (e.g., ruminating) and increased depressed mood (i.e., Joorman et al., 2007). In addition, it might be relevant to examine whether increased working memory capacity -due to training- mediates the relationship between stress and depressive symptoms.

Limitations

This section briefly discusses the limitations of the presented studies. First, participants in all studies were mainly female of a specific age group (adolescents/ young adulthood). This indicates that our findings cannot be easily generalized to other populations (e.g., males or adults). Replication in other groups is needed in order to generalize the current findings. Second, our age group ranged from early adolescence (Chapters 5-6) to young adulthood (Chapters 2-4). Because adolescence is characterized by developmental change and exploration of possible life directions (Arnett, 2000), change in self-attitudes during this phase also often occurs. Research on the development of self-esteem across life span indeed shows a significant decrease in explicit self-esteem from early adolescent years to young adulthood, when the levels of self-esteem start to increase again (Robins & Trzesniewski, 2005). Consequently, we cannot rule out the possibility that associations among (implicit) self-attitudes, depression, stress, and treatment differ between early adolescents and young adults. Third, our research in Chapters 2 and 3 utilized only a cross sectional design. Hence, we cannot draw conclusions about causality of the link between damaged self-esteem and internalizing problems.

Fourth, although implicit attitudes provide us with additional knowledge of psychopathology, several conceptual and methodological problems emerge. That is, in current literature there is an ongoing debate about the definition of implicit attitudes. De Houwer (2006) argued that the use of the term *implicit* is problematic because it seems to refer only to the presumed state of unconsciousness of these attitudes. Because participants are can be aware of their attitudes and of the attitudes that are being measured indirectly (cf. De Houwer, 2006), De Houwer suggested that instead of the term *implicit,* the term *automatic* is more appropriate. According to De Houwer and colleagues (2009), automaticity refers to several testable features (i.e., unconscious, uncontrollable, unintentional, and efficient way of processing), which can co-occur or become activated independently (Bargh, 1994; De Houwer et al., 2009). In this thesis, we did not make a distinction between

different features of automaticity in attitudes in relation to adolescent and young adult depression. Future research could investigate different features of automaticity in the outcome of indirect measures and their relationship with psychopathology.

Moreover, implicit self-esteem is defined as the relatively automatic, overlearned, and nonconscious evaluation of the self that guides spontaneous reactions to self-relevant stimuli (Greenwald & Banaji, 1995). When applying this definition of implicit self-esteem, the outcome of both indirect measures that were used in this thesis (IAT and NLT) can be seen as individuals' implicit self-esteem. However, no correlations between the IAT and NLT were found across all studies, despite the fact that they refer to the 'same concept'. This illustrates the complexity of self-attitudes. In order to understand this finding, it has been argued that implicit self-esteem is a multidimensional construct and that different indirect measures capture distinct aspects of implicit self-esteem (Koole & Pelham, 2003). However, the construct validity of the IAT and NLT to assess implicit self-esteem has also been disputed (Buhrmester et al., 2011). Buhrmester and colleagues argued that (implicit) self-esteem is a concept that is too complex and not easily reduced to a simple self-related association (e.g., NLT). As a result, Buhrmester and colleagues called on researchers to focus on developing new instruments to assess implicit self-esteem.

Although studies using the IAT and NLT can provide us with interesting knowledge of implicit attitudes and psychopathology, it seems highly relevant to examine the ways to improve the measurements of implicit self-esteem in order to take the next step in this area of research. To illustrate, in this thesis, we argued that it is necessary to design future studies with longitudinal designs to further examine the association of implicit self-esteem and depression and the malleability of implicit self-esteem by treatment. However, the findings from this thesis suggest (Chapter 6) that the IAT and NLT might not be appropriate instruments in a repeated measure design due to test-retest effects (cf. IAT: Huijding, 2006). Accordingly, at this moment, it remains difficult to draw conclusions about the temporal stability of implicit self-esteem. On the one hand, research has suggested that implicit self-esteem is the outcome of 'experiences children had with their parents while growing up' (DeHart et al., 2006, p.13). As argued before, in line with this hypothesis, implicit self-esteem is thought to be more primitive and develops earlier based on early interactions with primary care givers (e.g., DeHart et al., 2006). From this perspective, implicit self-esteem seems to be a rather stable *trait*. However, contrary to this view, implicit self-esteem has also been shown to posses *state* qualities (cf. Baccus et al., 2004; Grumm et al., 2008). In Chapter 4, we found that induced stress decreased implicit self-esteem. Additionally, it has been argued that the temporal stability of implicit self-esteem is relatively weak (Buhrmester et

al., 2011). Buhrmester and colleagues stated that whether fluctuations in implicit self-esteem are due to instability in the construct or the amount of measurement errors in general in indirect measures remains unclear. As in the domain of explicit self-esteem, the development of separate measures for trait and state implicit self-esteem seems relevant for resolving this contradiction. DeHart and colleagues (2006) suggested a (temporary) solution to assess *trait* implicit self-esteem, stating, 'the ideal way to assess trait implicit self-esteem would be to administer implicit self-esteem on several occasions and take an average across all these occasions' (p.8). Although we are aware of the ongoing debate about the IAT and NLT that enfolded recent years, we chose to use current instruments because a) when we started this research, these were the two commonly used indirect measures of implicit self-esteem, and b) other research showed acceptable test-retest reliability and predictive validity (Karpinski, 2004). Hence, these tests were the best ones available at that time.

Finally, another important limitation concerns the way in which the findings of our first two studies were presented. Our first study applied a cross-sectional design in which data were collected on implicit and explicit self-esteem and relevant outcome measures on internalizing problems. Three measures of implicit self-esteem were administered; NLT, IAT and the Brief IAT. The results of this cross-sectional study were presented in two separate papers, which we now realize (in retrospect), was not in line with 'good scientific practice'. In the first paper (Chapter 2) we focused on the association of the NLT with measures of internalizing problems, while in the second paper (Chapter 3) we reported on the relationship between IAT and Brief IAT with internalizing problems. The reason why we eventually presented the data in two separate papers is that our primary hypothesis concerned a test on the NLT (based on Franck et al., 2007a) and we aimed for a straightforward paper. Later on, on a more exploratory basis, we decided to test the effects of the IAT as well. However, we now realize that for several reasons the results of both analyses should have better been reported in one paper: First, fragmented publications can be experienced as misleading because they can easily be interpreted as independent studies (APA, 2010). Scientific literature can become distorted by fragmented publications due to erroneous conclusions in reviews and meta-analyses (APA, 2010), and in general scientific knowledge can become fragmented instead of a comprehensive integration of findings (Bray, 1994). Second, different instruments of implicit self-esteem may influence each other which was -due to reporting the results separately- insufficiently addressed in the two papers. To address this issue, we additionally performed similar post-hoc analyses (conventional and discrepancy regression analyses) in which we entered 'order of administration' into the regression models to control for 'order effects'. Analyses show a similar pattern of results (see page 61-63). Third, reporting only

one measure of implicit self-esteem without describing the assessment of other instruments aiming to measure the same concept as done in the first paper may lay the foundation for selective publication.

Implications for Clinical Practice

The most important question still remains; how can a therapist benefit from our findings in order to eventually help people like Lisa (see intro)? We think that with regard to clinical implications, the research presented in this thesis should be divided into two. First, in Chapter 5, we found that active screening (in schools) and participation in the CBT-component of OVK significantly decreased the level of depressive symptoms. Given the major burden of depression on society and the disrupting short- and long-term consequences at an individual level, we posit that it is necessary to adopt a more active approach to identify and adequately treat depressive complaints by means of CBT during adolescence. In line with this recommendation, it has been suggested that active screening and subsequently providing an effective psychological intervention is 'good value for money' (Mihalopoulos, Vos, Pirkis, & Carter, 2012). Reaching and identifying adolescents with depressive symptoms or adolescents at risk for developing depressive disorders (e.g., KOPP) has been found problematic. Therefore, within the context of schools, an important step would be to pro-actively screen adolescents on internalizing problems and guide them if necessary within their own environment to improve mental health care with regard to internalizing problems.

Second, our main focus was on the relevance of implicit and explicit self-attitudes in relation to stress, depression, and treatment. Although on this topic several questions were answered new questions arose that should be considered in order to further explore the role of implicit self-attitudes in relation to depression. We think that at this point, it is definitely too early for therapists to use indirect measures in their clinical practice. The field of empirical research on implicit self-attitudes (and implicit-explicit discrepancies) and depression is still in its infancy, lacking consistent findings needed to develop a comprehensive theory about the relationships among these constructs. Although this conclusion is quite disappointing for a therapist, this field of research is potentially relevant in order to eventually quantify and modify automatic processes that are relevant in adolescent/young adult depression. Perhaps to make indirect measures applicable for the clinical practice, the first step should be to develop a standardized procedure to assess implicit self-esteem and to develop norm scores (e.g., low-mean-high). This way, therapists may become aware of the likely existence of 'fragile' or 'damaged' self-esteem in their patients and subsequently incorporate this information within

their therapy. For example, the presence of 'damaged' self-esteem can be discussed when developing a holistic theory in order to gain a better perspective of aspects that where associated with (recent) failure. Moreover, in individuals with 'fragile' self-esteem, it might be possible for therapists to use this information to talk about the client's childhood and about relationships with primary care-givers in relation to self-esteem. However, it should be noted that incorporating this information within current therapies can only be of additional nature and used explorative in interaction with a patient, and not as guiding principle.

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This Thesis

Creemers, D.H.M., Scholte, R.H.J., Engels, R.C.M.E., Prinstein, M.J., & Wiers, R.W. (2012). Implicit and explicit self-esteem as concurrent predictors of suicidal ideation, depressive symptoms and loneliness. *Journal of Behavior Therapy and Experimental Psychiatry, 43*, 638-646.

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Nederlandse Samenvatting | Dutch Summary

Er bestaat veel wetenschappelijke ondersteuning voor de veronderstelling dat zelfwaardering bijzonder relevant is voor het psychisch welbevinden. Het ontstaan en in stand houden van depressieve gevoelens gaan vaak gepaard met een negatieve zelfwaardering. Een negatieve zelfwaardering wordt over het algemeen gezien als een belangrijke oorzaak in het ontstaan van depressie via inter,- en intrapersoonlijke routes. Adolescenten met een lage zelfwaardering zoeken meer geruststelling bij vrienden, of juist negatieve feedback om hun negatieve kijk op zichzelf bevestigd te zien (inter-persoonlijke route). Dit kan leiden tot sociale uitsluiting, afwijzing en minder sociale steun met depressieve klachten als gevolg. Tevens kan een lage zelfwaardering via intra-persoonlijke wegen leiden tot depressieve klachten; adolescenten met een negatieve zelfwaardering hebben de neiging meer te piekeren over negatieve (zelf)-aspecten wat weer kan leiden tot hogere niveaus van depressie.

Volgens cognitieve theorieën zijn de bouwstenen van zelfwaardering 'cognitieve schema's' hetgeen opvattingen en overtuigingen zijn over (in dit geval) 'het zelf'. Schema's worden op basis van eerdere ervaringen gevormd en bepalen in belangrijke mate hoe mensen de omgeving interpreteren, én beïnvloeden het gedrag dat hierop volgt. Tot op heden heeft onderzoek zich vooral gericht op zelfschema's die expliciet zijn; beschikbaar voor introspectie, meer bewust, rationeel en gecontroleerd. Een voorbeeld is expliciete zelfwaardering. Expliciete zelfwaardering kan worden gedefinieerd als een individu's bewuste gevoel van eigenwaarde en zelfacceptatie. Expliciete zelfwaardering wordt voornamelijk afgenomen door middel van vragenlijsten. De afgelopen decennia zijn in aanvulling op het meten van expliciete zelfschema's, indirecte instrumenten ontwikkeld die vanwege een aantal redenen interessant zijn voor onderzoek naar psychopathologie: a) indirecte meetinstrumenten zijn niet afhankelijk van het vermogen tot bewuste introspectie of de toegankelijkheid van zelfschema's, b) indirecte meetinstrumenten zijn niet gevoelig voor sociale wenselijkheid, en c) indirecte meetinstrumenten meten automatische associaties in het geheugen tussen bepaalde stimuli (e.g., zelf gerelateerde stimuli) en attributies (e.g., waardevol - waardeloos). Middels indirecte meetinstrumenten is het dus mogelijk om -in aanvulling op expliciete zelfwaardering- ook impliciete zelfwaardering te meten. Impliciete zelfwaardering wordt gedefinieerd als een relatief automatische en meer onbewuste evaluatie van 'het zelf'.

Volgens psychologische duaal procesmodellen kunnen we onderscheid maken tussen twee informatieverwerkingsmodi met verschillende werkingsprincipes; de *cognitieve* en de *associatieve* modus. Expliciete zelfwaardering weerspiegelt een product van de cognitieve functie, voornamelijk gevormd door rationele en

bewuste verwerking van zelf-relevante stimuli, terwijl impliciete zelfwaardering (voornamelijk) voortkomt vanuit de associatieve modus, gevormd door middel van automatische, intuïtieve verwerking van affectieve ervaringen. Tot op heden is er nog weinig onderzoek gedaan naar de relatie tussen impliciete zelfwaardering en internaliserende problemen (bij adolescenten). In eerder onderzoek is ook beschreven dat mogelijk de *discrepantie* tussen impliciete en expliciete zelfwaardering relevant is in relatie tot internaliserende problemen. Er bestaat de mogelijkheid dat impliciete zelfwaardering zich eerder ontwikkelt dan expliciete zelfwaardering en voortkomt uit vroege sociale interacties met de primaire opvoeders. Expliciete zelfwaardering zou meer representatief zijn voor het recente functioneren van een individu. In *Hoofdstuk 2 en 3* werd de relatie van impliciete en expliciete zelfwaardering met depressie, suïcidale ideatie en eenzaamheid onderzocht bij jong volwassen vrouwen. Ook werd er specifiek gekeken naar de relatie van de discrepantie tussen impliciete en expliciete zelfwaardering met deze maten van internaliserende problemen. De resultaten lieten zien dat een lagere mate van zelfwaardering geassocieerd was met hogere scores op depressie, suïcidale ideatie en eenzaamheid. Impliciete zelfwaardering bleek niet direct gerelateerd aan deze internaliserende problemen. De discrepantie tussen impliciete en expliciete zelfwaardering bleek gerelateerd te zijn aan symptomen van depressie, suïcidale ideatie en eenzaamheid. Een belangrijke consistente bevinding was dat de richting van de discrepantie steeds relevant was: 'beschadigde zelfwaardering' (i.e impliciete zelfwaardering hoger dan expliciete zelfwaardering) werd geassocieerd met hogere niveaus van depressie, suïcidale ideatie en eenzaamheid. Tussen 'fragiele zelfwaardering' (impliciete zelfwaardering lage expliciete zelfwaardering) en depressie, suïcidale ideatie en eenzaamheid werden geen relaties gevonden. Hoewel in beide hoofdstukken (*Hoofdstuk 2 en 3*) verschillende indirecte instrumenten werden gebruikt om impliciete zelfwaardering te meten waren de resultaten vergelijkbaar.

In *Hoofdstuk 4* werd het effect van acute stress op zowel impliciete als expliciete zelfwaardering onderzocht. Cognitieve theorieën veronderstellen dat depressieve symptomen het gevolg zijn van disfunctionele (zelf)schema's die geactiveerd worden door stressvolle gebeurtenissen. Impliciete en expliciete instrumenten van zelfwaardering en depressie werden gemeten voor en na een stress - inductie procedure, waarbij de helft van de deelnemers werd ingedeeld in de experimentele groep en de andere helft in de controle groep. Stress werd geïnduceerd aan de experimentele groep door aan deelnemers te vragen een speech te geven voor een camera waarin ze hun mening geven over de oorlog in Irak. Deelnemers in de controle groep werd gevraagd anagrammen op te lossen. De experimentele groep liet een toename in stress zien als gevolg van de stress inductie. Vervolgens toonden de resultaten aan dat acute stress leidde tot een verhoogde score op impliciete depressie en een verlaagde score op impliciete zelfwaardering. Dit betekent dat

acute stress zorgt voor de activatie van automatische associaties gekenmerkt door negatieve zelfevaluatie en somberheid. Acute stress bleek geen invloed te hebben op expliciete maten van zelfwaardering en depressie.

In *Hoofdstuk 5* werd onderzocht of een Cognitieve Gedragstherapie (CGT) interventie ('Op Volle Kracht') een verlagend effect had op de verhoogde depressieve klachten van adolescente meisjes. Meisjes uit het eerste en tweede jaar van de middelbare school werden gescreend op depressieve klachten en meisjes met verhoogde klachten werden geselecteerd. In totaal namen 102 meisjes deel aan de studie welke gerandomiseerd werden over de experimentele en controle groep. De experimentele groep kreeg 8 sessies CGT ('Op Volle Kracht') aangeboden en werd gevolgd op verschillende uitkomstmaten, terwijl de controle groep alleen gevolgd werd. De resultaten toonden aan dat depressieve klachten verminderden als gevolg van de CGT interventie. Tevens vonden we dat meisjes in de experimentele groep na zes maanden nog steeds lagere scores rapporteerden op depressieve klachten dan meisjes in de controle groep.

In *Hoofdstuk 6* is vervolgens onderzoek gedaan naar het effect van de CGT interventie ('Op Volle Kracht') op impliciete en expliciete zelfwaardering, en de discrepantie score tussen impliciete en expliciete zelfwaardering. Onze bevindingen laten zien dat CGT geen invloed had op impliciete zelfwaardering of de discrepantie tussen impliciete en expliciete zelfwaardering. Expliciete zelfwaardering liet als gevolg van de CGT interventie een significante toename zien in vergelijking met de controlegroep. Onze bevindingen suggereren dat CBT uitsluitend expliciete zelfschema's (i.e. expliciete zelfwaardering) verandert, die rationeel en controleerbaar zijn op basis van reflecterende processen, terwijl impliciete zelfschema's (i.e. impliciete zelfwaardering) -die meer automatisch en moeilijk te controleren zijn- niet worden beïnvloed.

Conclusies:

- Lagere expliciete zelfwaardering is gerelateerd aan hogere scores op internaliserende problemen.
- Impliciete zelfwaardering is niet direct gerelateerd aan internaliserende problemen.
- De discrepantie tussen impliciete en expliciete zelfwaardering -gemeten met de IAT en NLT- werd geassocieerd met hogere scores op depressieve symptomen, suïcidale gedachten, en eenzaamheid. De richting van de discrepantie bleek steeds relevant: specifiek 'beschadigde zelfwaardering' (i.e. impliciete zelfwaardering > expliciete zelfwaardering) werd geassocieerd met hogere niveau van depressie, suïcidale ideatie en eenzaamheid.
- Acute stress versterkt automatische associaties gekenmerkt door negatieve zelfevaluatie en somberheid; Acute stress zorgde voor een verlaging van impliciete zelfwaardering en een verhoging van impliciete depressie.
- CGT ('OP Volle Kracht') is effectief in het reduceren van depressieve klachten bij adolescente meisjes met verhoogde niveaus van depressieve symptomen.
- CGT ('Op Volle Kracht') heeft effect op expliciete zelfwaardering maar niet op impliciete zelfwaardering (of de discrepantie score) bij adolescente meisjes met verhoogde depressieve klachten.

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Samen is niet alleen (Allstars, 2001)

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Curriculum Vitae

Daan Creemers was born on Februari 9th 1982 in Nijmegen, The Netherlands. He received his secondary education diploma in 1999 at Nijmegen-West, and subsequently started an education to become a Sport Instructor (CIOS). In 2003 he graduated at the CIOS and in the same year he started at the PABO in Nijmegen. One year later he started a combined education trajectory at the PABO and the Radboud University of Nijmegen (Orthopedagogiek). In 2006 he graduated from the PABO, and in 2008 he received his master degree at the Radboud University. Besides his dedication to the clinical work, he became increasingly interested in doing research during his Master year. In 2008 he was able to obtain a position as a therapist at GGZ Oost-Brabant and was (partly) exempted for clinical hours to be able to conduct clinical research. His main topic of interest is the etiology, prevention and treatment of depression in adolescents. This resulted in his dissertation: 'Implicit and Explicit Self-Attitudes in Relation to Adolescent and Young Adult Depression, Stress and Treatment'.

During his PhD-project Daan became committed to contribute to a better integration of research within the clinical field. With great support from GGZ Oost-Brabant as well as the Radboud University, Behavioural Science Institute, he played a major role in establishing and intensifying their collaboration. Since 2011 Daan has been the research coordinator on internalizing problems in children and adolescents at GGZ Oost Brabant and, in collaboration with the Radboud University, four new PhD-projects at GGZ Oost-Brabant were started -all aimed on internalizing problems in youth. He still combines his research coordination with his work as a clinician at GGZ Oost-Brabant and recently started the clinical training to become health care psychologist (GZ-psycholoog).